

# AUTOMOTIVE INDUSTRIES

**AUTOMOBILE**

Vol. 66

Reg. U. S. Pat. Off.

No. 2

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J. S. HILDRETH, Vice-Pres. and Director of Sales  
W. I. RALPH, Vice-Pres.  
A. H. VAUX, Secretary and Treasurer  
JOHN A. CLEMENTS, Asst. TreasurerJULIAN CHASE, Business Manager  
Automotive Industries  
Cable Address .....GEO. D. ROBERTS  
Advertising Manager  
Autoland, Philadelphia  
Telephone .....

Sherwood 1424

### OFFICES

New York—U. P. C. Bldg., 239 W. 29th St., Phone Pennsylvania 6-0080  
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Automotive Industries

# WYMAN GORDON

## AUTOMOTIVE AND AVIATION FORGINGS

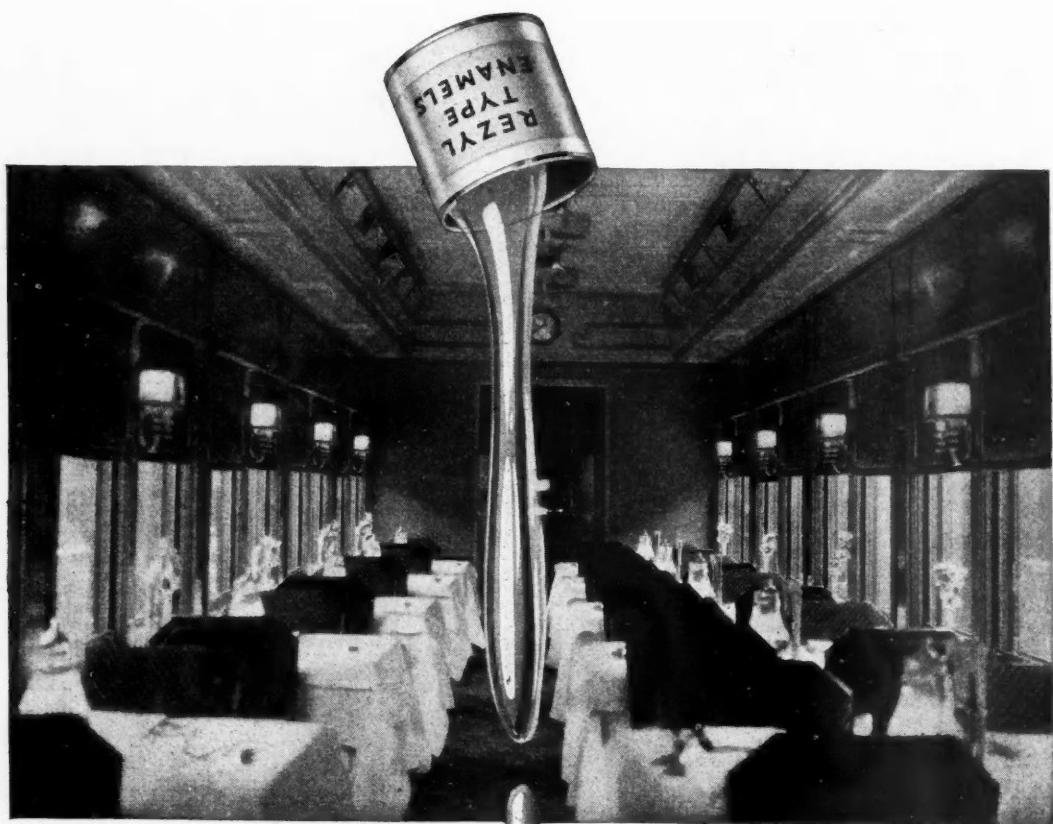


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REDUCTION GEARS



**WYMAN GORDON**  
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HARVEY, ILL.

January 9, 1932



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535 Fifth Avenue New York

# AUTOMOTIVE INDUSTRIES

VOLUME 66

JANUARY 9, 1932

NUMBER 2



Automotive Industries—Brown Bros. photo

## "Welcome World—"

Says



General Manager, National  
Automobile Chamber of Commerce

**O**N behalf of the entire motor industry we wish to extend the most cordial invitation for everyone to attend the National Automobile Show which is being held in Grand Central Palace, New York, during the week of Jan. 9-16.

In so doing, we offer a personal assurance that you will be well repaid by a visit to the show.

The show this year is something more than an exhibit of motor vehicles and accessories. It is the concentration of the resources of the nation's largest manufacturing industry in a determined offensive to free the nation from the tyranny of the depression.

When the doors of Grand Central Palace swing open

at noon today, the public will find a mighty industry mobilized for a crusade to banish much of our fear and to restore the confidence so necessary to prosperity's return.

The time for such a demonstration is auspicious.

A hungry world cannot much longer continue to deny itself the necessities of life while billions of dollars lie idle and unused in its banks and vaults.

Such has been the sincere belief of the industry's leaders who, in their preparations for the show, have dedicated their efforts to the creation of a spectacle that will awaken in the public mind a new appreciation of the nation's fundamental stability.

Although their factory operations have been held to reduced schedules, motor manufacturers have not been idle during the last two years.

The engineering, production and marketing genius of the industry have been concentrated on the single objective of supplying the public with the safest and most economical personal transportation possible.

How well they have succeeded will be demonstrated at the show where, without exception, the exhibits will offer the greatest dollar values in the history of the automobile industry.

Should these efforts of the motor manufacturers result in breaking the log jam of buying apathy, the benefits will extend beyond the industry and contribute

to the general recovery of all business. As one of the country's largest employers of labor and consumers of raw materials and manufactured products, the automobile business would distribute the profits of increased business throughout the nation.

The fact that we entered 1932 with 500,000 fewer motor vehicles in the United States than there were a year ago is no indication that highway transportation is on the decline. The automobile is still an article of universal desire. The half million families that were forced to forego the use of their automobiles during the depression still desire and need motor cars as much as ever. They may be expected to fill that need and desire as soon as their means will permit.

The fact that motor vehicle usage, as measured by gasoline consumption, established a new record during 1931 despite the fact that fewer vehicles were being operated, is in itself the guaranty of the industry's future.

## Preliminary Facts and Figures

of the Automotive Industry  
during the year 1931

by Alfred Reeves

### Production

|  |                 |
|--|-----------------|
| Cars and trucks produced in U. S. and Canada                                       | 2,460,000       |
| Passenger cars   | 2,040,000       |
| Motor trucks   | 420,000         |
| Production of closed cars  | 1,880,000       |
| Per cent closed cars   | 92%             |
| Wholesale value of cars  | \$1,170,000,000 |
| Wholesale value of trucks  | \$260,000,000   |
| Wholesale value of cars and trucks combined  | \$1,430,000,000 |
| Average retail price of cars   | \$765           |
| Average retail price of trucks   | \$824           |
| Tire shipments   | 51,000,000      |
| Wholesale value of parts and accessories for replacements, and service equipment   | \$341,000,000   |
| Wholesale value of rubber tires for replacement                                    | \$325,000,000   |
| Motor vehicles, accessories, service equipment and replacements of parts and tires | \$2,101,000,000 |

### Registration

|   |                 |
|---|-----------------|
| Motor vehicles registered in U. S. (From state reports) | 25,940,000      |
| Motor cars  | 22,450,000      |
| Motor trucks  | 3,490,000       |
| World registration of motor vehicles                    | 34,575,000      |
| Per cent of world's automobiles in U. S.                | 75%             |
| Passenger cars on farms (1930)                          | 4,134,675       |
| Motor trucks on farms (1930)                            | 900,385         |
| Motor vehicles on farms                                 | 5,035,060       |
| Telephones on farms (1930)                              | 2,139,194       |
| Miles of surfaced highways                              | 725,000         |
| Total miles of highways in U. S.                        | 3,024,233       |
| Highway and street expenditures                         | \$2,400,000,000 |
| Persons employed in motor vehicle and allied lines      | 4,020,000       |
| Gasoline taxes  | \$524,000,000   |
| Total motor vehicle taxes                               | \$1,022,000,000 |

### Automobile's Relation to Other Business

|   |           |
|---|-----------|
| Automobile industry largest manufacturing industry based on value of finished products                          |           |
| Automotive industry largest purchaser of gasoline, rubber, steel, lubricating oil, plate glass, nickel and lead |           |
| Number of carloads of automotive freight shipped over railroads in 1931   | 3,090,000 |
| Rubber used by automobile industry  | 83%       |
| Plate glass used by automobile industry   | 60%       |

|  |             |
|--|-------------|
| Iron and steel used by automobile industry       | 16%         |
| Lumber, hardwood, used by automobile industry    | 17%         |
| Copper used by automobile industry               | 14%         |
| Lead, used by automobile industry                | 26%         |
| Aluminum used by automobile industry             | 17%         |
| Nickel used by automobile industry               | 30%         |
| Tin used by automobile industry                  | 11%         |
| Zinc used by automobile industry                 | 8%          |
| Gasoline consumption by motor industry           | 85%         |
| Gasoline used by motor vehicles, 1931 (bbls.)    | 342,000,000 |
| Lubricants used by motor vehicles (bbls.)        | 10,300,000  |
| Lubricants, per cent used by motor vehicles      | 50%         |
| Crude rubber used by motor industry, 1931 (lbs.) | 649,700,000 |
| Cotton fabric used in tires, 1931 (lbs.)         | 191,500,000 |

### Motor Truck and Motor Bus Use

|  |           |
|--|-----------|
| Motor trucks in use                                | 3,490,000 |
| Per cent of all motor trucks used by farmers       | 26%       |
| Motor truck owners                                 | 2,530,000 |
| Motor buses in use                                 | 96,500    |
| Consolidated schools using motor transportation    | 17,000    |
| Buses used by consolidated schools                 | 49,000    |
| Buses used by street railways                      | 12,500    |
| Buses used by steam railroads                      | 5,000     |
| Street railways using motor buses                  | 270       |
| Steam railroads using motor buses                  | 80        |
| Railroads using trucks as part of shipping service | 85        |
| Motor trucks used by steam railroads               | 10,000    |
| Motor trucks used by Railway Express Agency        | 9,427     |

### Foreign Sales

|   |               |
|---|---------------|
| Number of American motor vehicles sold outside U. S.                    | 315,000       |
| Per cent decrease in foreign sales under 1930                           | 44%           |
| Per cent of production sold outside U. S.                               | 13%           |
| Value of motor vehicles, parts and tires exported from U. S. and Canada | \$162,500,000 |
| Number of motor vehicles imported, 1931                                 | 710           |

### Motor Vehicle Retail Business in U. S.

|  |         |
|--|---------|
| Total car and truck dealers                | 46,000  |
| Garages, service stations and repair shops | 98,000  |
| Supply stores                              | 75,000  |
| Gasoline filling stations                  | 350,000 |

# JUST AMONG OURSELVES

## GM Inaugurates New Policy

**N**EWS comes from down North Carolina-Georgia way that a single staff of zone travelers for General Motors will represent all G.M. cars—except Chevrolet—in that area in the future. The separate companies, in other words, will not have individual forces of field men bent on getting new dealers and helping old ones.

Haven't been able to find out whether this portends similar action throughout the country, but whether it does or not, it is interesting to speculate for a moment on the effects of such a policy. Let's see.

## The Idea Seems to Fit

**T**HE idea seems to fit in with the tendency of General Motors to permit or urge the same dealer to handle more than one make of G.M. cars in smaller towns and locations where such practice seems warranted. It should permit the development of unusually high grade field men, more capable than the average of accurately interpreting company policy in practical dealer relationships. It should result in far more uniform application of corporation policies in connection with dealers of each individual make.

There is, of course, the possibility of difficulties arising from the fact that the individual

sales managers of each of the units will have to get their field work done through a single staff of men; but such a thing has been done successfully before and probably can be done again.

In any case, this new General Motors setup in the Southeast will be watched with real interest by everyone in the industry and trade. (For details see *Automotive Industries*, Jan. 2, page 25.)

## Plymouth Woos the Independents

**P**LYMOUTH is again making a definite bid for the favorable attention of independent repair shops by putting into the hands of such shops detailed maintenance data concerning Plymouth automobiles.

Just about a year ago Plymouth sent out to independents the first information of this kind ever going from a car factory directly to independent repair shops, so far as we know. It was the first practical recognition by a car factory of the legitimate existence of the independent in the repair field.

The fact that the process is being repeated indicates that the reaction was favorable. And it can't have any adverse effect on the sale of original Plymouth parts to these independent shops, either!

In the meantime Plymouth dealers almost certainly are getting every bit of the repair

work from Plymouth owners that they would be getting anyhow, even if the factory attitude made it necessary for the independent to bootleg his information, as is the case in most other instances. We think Plymouth has the right idea.

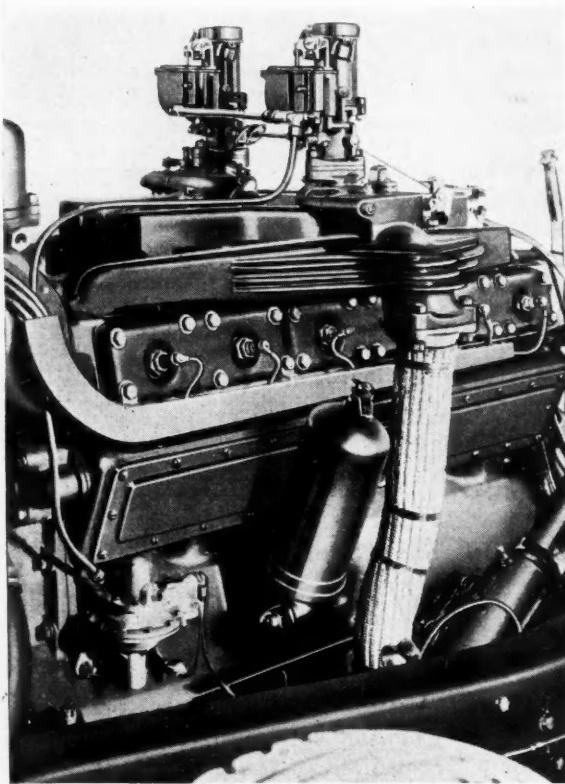
## Now for the Show Season

**W**HEN this magazine reaches your hands the New York Show—first of the 1932 series of automobile and parts exhibits—will have its doors open. Thousands of people will be crowding its aisles as in years past. The eager and the skeptical; the old and the young; the poor and the rich (if still there be any of the latter) will all be there. Good times or bad times, it makes no difference. People still are interested listeners when the automobile industry speaks; still run to look when the automobile industry cries "Lo, behold!"

But this year the industry and its salesmen have to work as never before to turn interest into sales. Before going to New York at all, before going to Chicago or to any of the local shows to follow, we can say with certainty, "It was not a buying show."

It remains with the individual men representing individual companies by their individual efforts to make true the statement after it is all over—"It was a selling show!"—N.G.S.

# Vacuum-Operated Selective Rear Axle

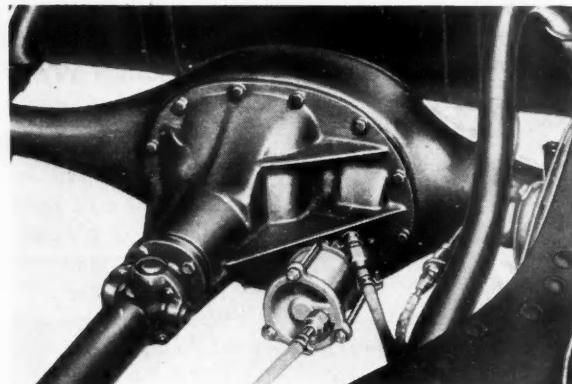


Close-up view of the left side of the 12-cylinder 160 hp. Lycoming engine used in the new 12-160 Auburns. Note insulation of exhaust pipes, oil filter with manual cleaning feature, gasoline pump and down-draft Stromberg carburetors

Right—Photo shows differential case on the Auburn 12-160 and pneumatic connection for operating dual ratio

The 12-cyl. engine has a 45 deg. angle between cylinder banks, with single central camshaft. Connecting rods are rifle-drilled with offset hole

by Athel F. Denham



**A** 160-HP. TWELVE on a 133-in. wheelbase at spectacularly low prices has been added to its rear-drive line by the Auburn Automobile Co. for 1932. At the same time the eight has been improved, and selective-ratio or two-speed axles have been made available on both lines. There are now four Auburn chassis models, against two last year.

For 1932 the Auburn standard eight carries the free-wheeling unit as standard equipment, which heretofore has been supplied at an extra charge of \$85. It has a new camshaft designed to give more quiet valve action. Startix is standard equipment. A kick shackle has been added at the forward end of the left front spring, and the steering gear ratio has been increased to 22 to 1, for the elimination of wheel kick. Steering gears are larger and there is considerably more welding and bracing in the cowls, for body stiffening. Door hinges have been strengthened. A new brake lining is used to increase lining

and drum life. The line has been broadened by the addition of a speedster model.

In the Auburn custom eight the new axle is standard equipment. This car has ride regulators of Delco Products manufacture. More color combinations and trim schemes are available on this line. All changes made in the standard eight apply to the custom eight also.

The new twelve also comes in a standard and a custom line, the differences between the two being much the same as those between the two lines of eights. The twelves carry the same lines of bodies as the eights. All units, such as the transmission, universals, clutch and axles, are increased in size over those on the eight. Brakes are of the hydraulically-operated Bendix type, with the new Motor Wheel Corp. centrifuse drums. There is a mechanical hook-up for the rear wheel brakes, connected to the emergency lever. Frames are of the X-member

# Gear Ratio on New Auburn 8's and 12's

type as on the eights, but increased in proportion to wheelbase. Steering is also of the new 22-to-1 ratio type. These cars carry combination intake silencers and air cleaners, dual mufflers, etc.

As may be noted from the accompanying specifications and engine section, the new Auburn 12-cylinder engine is of the 45-deg. V-type. One advantage of the small angle is reduced overall width. Another is the uneven or "out-of-step" firing, which reduces the amplitude of any torsional vibration that may be set up.

Cylinders are cast integral with the crankcase, with the rocker arm and camshaft supports tying the two blocks together. Main bearings are well supported by ribs and webs, with longitudinal exterior ribs further adding to crankcase rigidity.

The horizontal valve arrangement makes possible the use of a single central camshaft, over which the rocker arm shaft is located. Both shafts and the valves can be rendered accessible by removing the valve cover in the vee of the engine. Helical gears at the front end of the camshaft drive the vertical distributor shaft.

Connecting rods are rifle-drilled for pressure lubrication to the piston pins. The drilled hole is slightly offset to one side of the axis, so that no material thickening of the web is required.

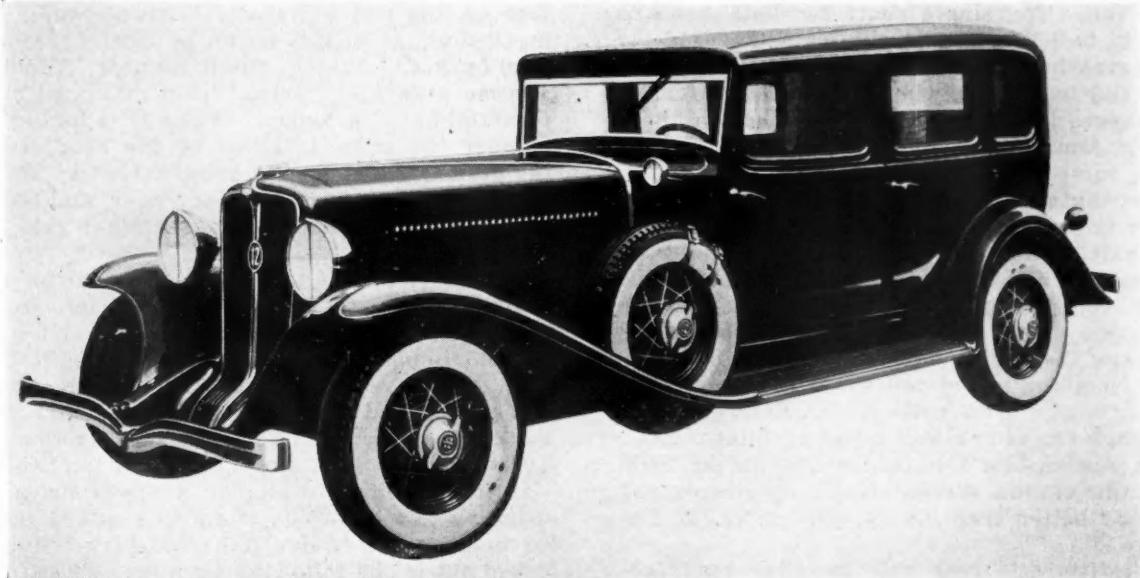
Combustion chambers are of unusual form. In the section they approach an inverted "T," with the major portion of the combustion chamber in the leg of the "T." Here the two valves are located side by side, with the spark plug opposite the intake valve. The upper part of the chamber flares out slightly at

the lower end into the cylinder proper, where there is a low clearance space over the entire outer periphery of the piston head. The design enables good waterjacketing, in spite of the valve arrangement, and its success is indicated by the use of a 5.75-to-1 compression ratio, for use with standard fuels.

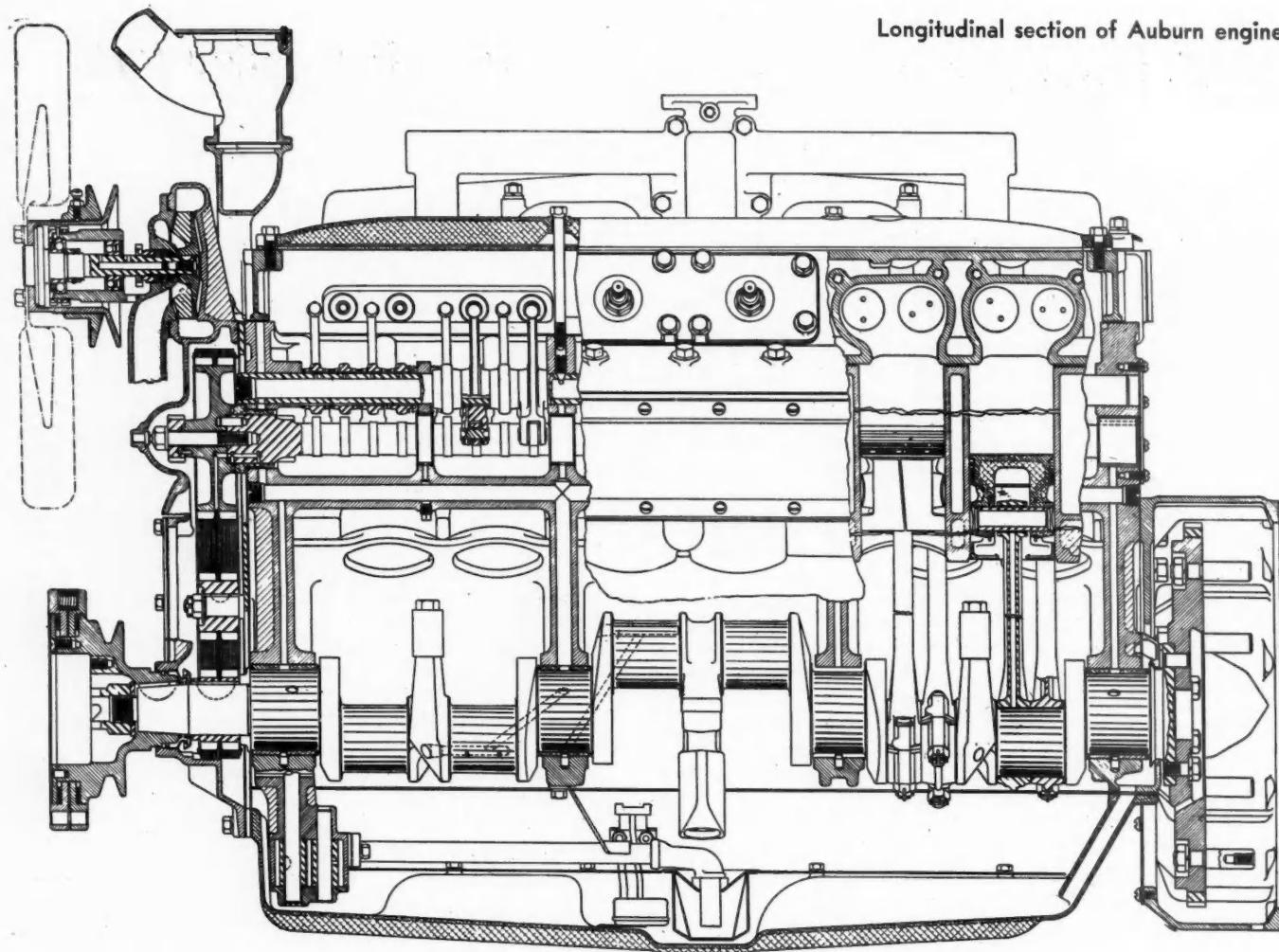
Cylinder head covers containing the spark plugs may be removed to regrind valves without removing the cylinder head from the block. The cylinder heads in turn may be removed without disturbing either the camshaft or rocker-arm assembly. Pistons and rods are removable through the bottom of the crankcase.

Each bank of six cylinders has its own intake and exhaust system. Intake manifolds are designed for downdraft carburetion and are combined with a center-outlet exhaust manifold. A heat control is provided for raising inlet manifold temperatures. Fuel pumps are of the plunger type, with double outlets to accommodate the two carburetors. This pump is driven off an eccentric on the oil-pump shaft and mounted on a pad at the left front side of the crankcase, where it is cooled by the fan blast for protection against vapor lock.

The lubrication system has been worked out to insure positive oil supply to all bearing surfaces. A gear-type pump, driven by a helical gear on the cam-shaft directly back of the front bearing, is screened behind a strainer. Oil is pumped directly into a full-flow filter, which unit also contains the pressure-relief valve. By-passed oil returns to the pan. Another by-pass valve permits oil to go direct from pump to bearings in case of clogging of the filter.



Auburn new 12-160 sedan has free wheeling, selective ride control and constant-mesh gear transmission



Longitudinal section of Auburn engine

Oil from the hollow rocker shaft is fed into valve rocker bearings. The rocker is also drilled for pressure lubrication of the roller bearings. The water pump is belt-driven from the crankshaft and is mounted on the front of the engine in combination with the fan. The single shaft for both units is mounted in ball bearings to eliminate the need for frequent greasing. Outlets from the pump lead to the right and left banks, where a distributing chamber discharges the water evenly into the length of the block. Bores are completely waterjacketed, as are ports, valve seats and spark plugs.

The distributor is located vertically at the front of the engine and driven through helical gears from the camshaft. There is an adjustable coupling on the driveshaft below the distributor head. The crankcase ventilating system outlet tube extends from the side of the crankcase down into the air stream below the engine oil pan. An auxiliary outlet leads from the top of the valve chamber cover into the air intake of the carburetor. Entry of fresh air is through the cap on the baffled oil-filler tube.

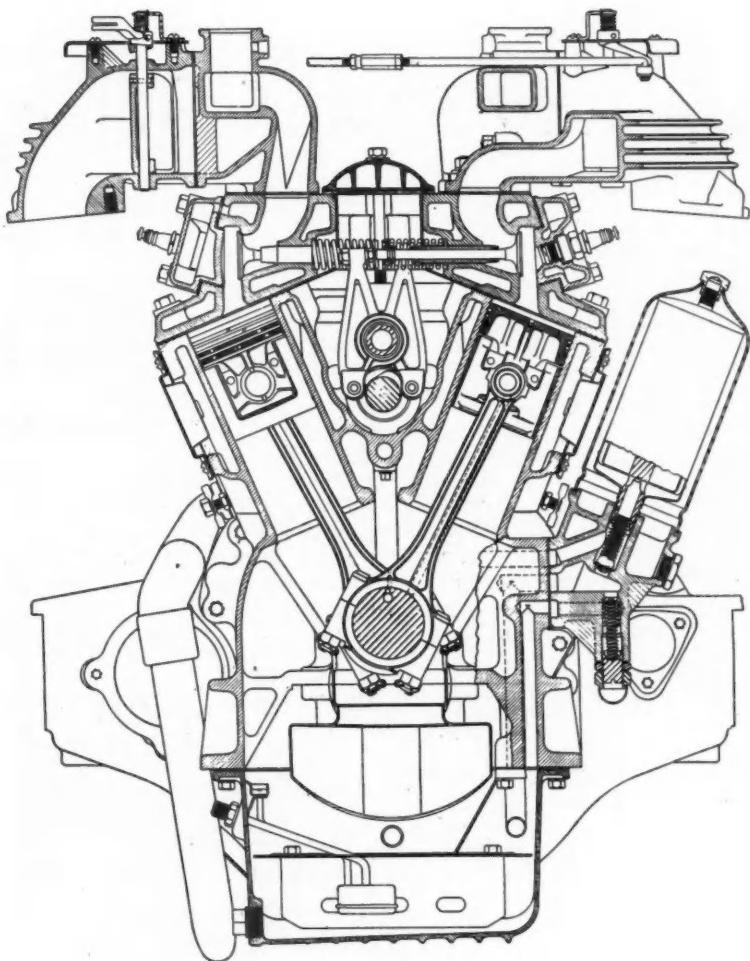
Auburn Automobile Co. claims 160 hp. at 3500 r.p.m. for this engine, representing a specific output of somewhat better than 0.4 hp. per cu. in. of displacement.

The selective-ratio rear axle is being manufactured by the Columbia Axle Co., a Cord Corp. subsidiary. It has a floating gear driven by a spiral bevel pinion in the conventional manner. Assembled

within the ring gear on stub shafts are five planetary gears which mesh with and drive an internal gear secured to an extension of the differential carrier. The sun gear around which rotate the planetary gears is machined on a sleeve which is mounted free on the left axleshaft. This sleeve is splined on the outside so that it can be locked against rotation by a sliding-dog clutch member, splined to it and meshing with internal teeth machined on a differential-housing flange. When it is locked in this manner the drive is taken by the ring gear from the pinion, the ring gear rotates, turning the planetary gears around the fixed sun gear, and the planetary gears in turn drive the internal gear on the differential carrier.

Differential idler gears are mounted on a cross shaft through the differential carrier, and thus transmit the torque to the side gears and the axleshafts. In other words, under these conditions there is a double reduction, one through the ring gear and pinion, and one through the planetary gears to the internal gear. The overall ratio in this case is 5.0 to 1 on the eight and 4.5 to 1 on the twelve.

If it is desired to employ a direct drive, corresponding to a reduction of 3.5 to 1 on the eight and 3.0 to 1 on the twelve, the planetary reduction is locked out in the following manner: The aforementioned sliding member is moved toward the ring gear so that internal teeth cut on the inner end of the sliding member engage teeth on ring-gear hub.



Cross-section of engine

The sun gear in the planetary train is now no longer locked against movement with respect to the axle housing, but is locked to prevent movement with respect to the ring gear. In other words, it must turn with the ring gear, thus eliminating reduction through the planetary gears. The drive then is transmitted from the pinion to the ring gear, from the ring-gear hub to the sliding member, from this member to the sleeve carrying the sun gear, and through the planetary gears (which cannot rotate now) to the differential carrier.

The actual shifting from one ratio to another is accomplished by intake manifold vacuum, and is pre-selective in character. A vacuum cylinder, connected to the intake manifold, with a valve operated by the clutch pedal in the line, is mounted directly on the axle housing. The piston in this cylinder is connected to a rocker arm with a cam trip which shifts the sliding member into engagement either with the teeth on the axle housing or with the teeth on the ring gear.

A pre-selecting lever is mounted on the dash. When it appears that there will be

need for higher acceleration, as in passing a car on a hill, the lever can be set to "low high." To accomplish the shift at any time thereafter it is necessary only to kick out the clutch pedal, the vacuum taking care of the actual shift. The return to "high high" is accomplished in the same manner.

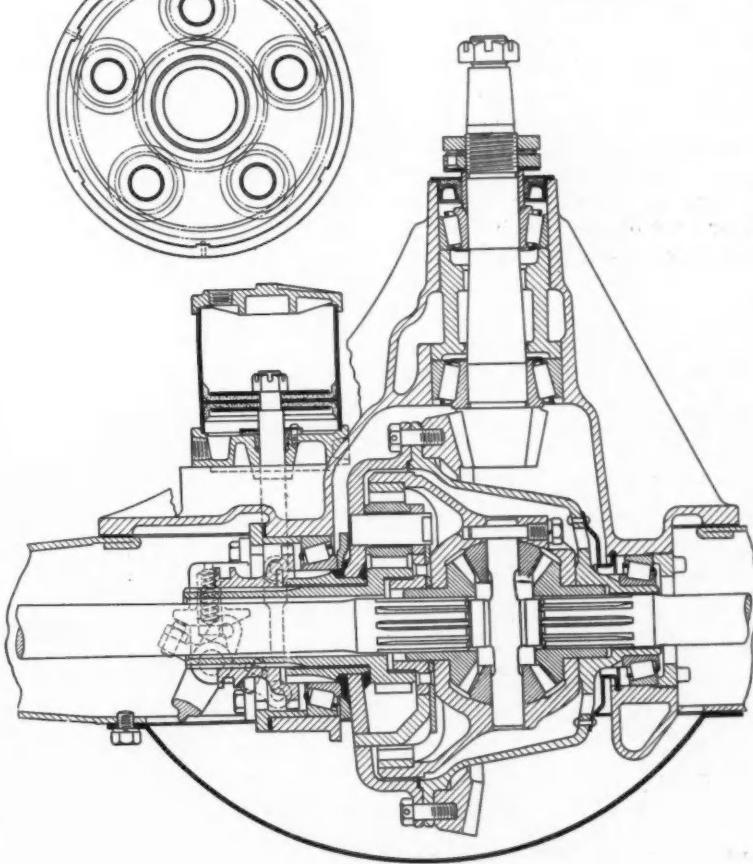
The axle is designed to give an "over-drive" effect in "high high," and slightly more than normal acceleration with standard axle ratios in "low high." In the higher speed position engine revolutions per mile are, of course, definitely reduced, which should be reflected in smoother running and decreased gasoline and oil consumption and wear at the higher road speeds.

A bronze bushing is provided between the ring gear and lockout gear and the splined shaft. Differential thrust bearings are of the taper roller type, and of rather large diameter. Pinion shafts, which are machined in one piece, are also carried on opposed taper roller bearings, with similar bearings at the wheel ends. The axle is semi-floating.

To take care of differences in axle ratios without the use of speedometers with double scales, arrangements are made whereby the speedometer-drive ratio is

(Turn to page 76, please)

Auburn two-speed rear axle in sections



# Hudson and Essex Add Power, Stiffened

**Free wheeling, ride control, and silent-second-gear synchronizing transmissions are found on 1932 lines with many detailed changes**

If we were asked to pick out one thing of all the features offered on the 1932 Hudson-Essex line as the most outstanding it would probably not be the increased horsepower for both lines, nor the combination of silent second synchronizing gears and free wheeling in the transmission, nor the adoption of ride-control or the new frame structure and body lines, important as these are. What we would probably pick is the rather remarkable attention to detail body design which is so evident everywhere in the new cars.

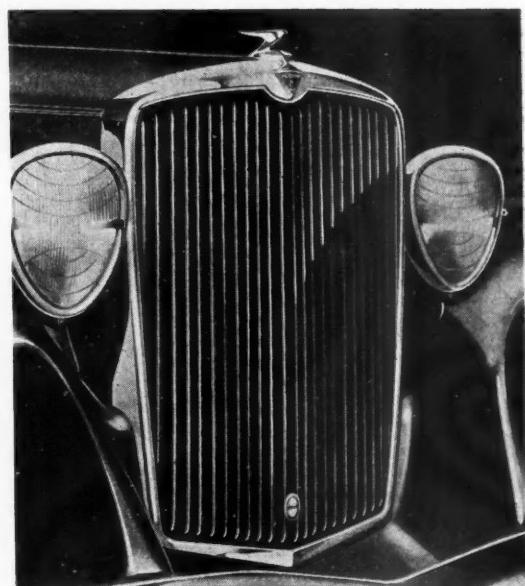
This attention to detail, to an extent which is quite unusual in cars of this price class, appears everywhere we look. There is the pleasing inclosure of the front end of the frame with sheet metal colored to match the fenders and integral with the latter, the treatment of the side-splashers, and the cleaned up rear end. There are the little things in the interior slide-type door-pocket fasteners, two glove or package compartments in the dash, the way instruments have been thought out, arranged, and simplified; the provision of folding side arm rests on the right and left front doors. Reflector-type tail-light lenses are used in all models. In some models rubberized fabrics are used for trim, permitting periodic renovation.

Then there is the way the running board is sloped upward from rear to front to blend better with the fender and side splasher line; the extension of the vertical vane radiator grille downward to cover the upper part of the splash pan; the simplified and easily accessible free-wheeling lock-out control; detailed at-

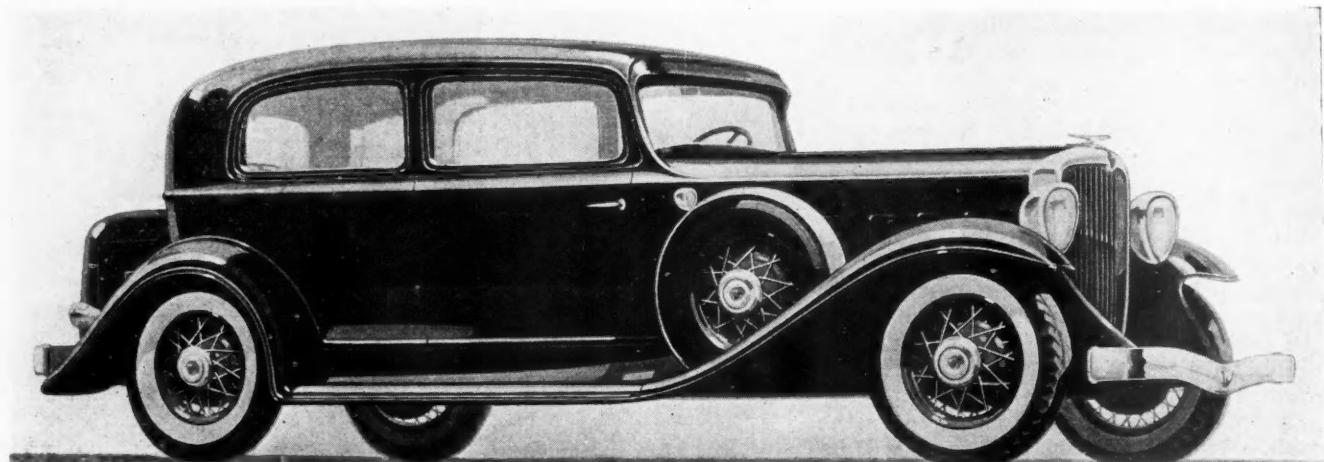
Two-door suburban sedan on the 126-in. wheelbase Hudson chassis

tention to body silencing and keeping out of fumes, etc.; a new system of upholstery spring arrangements, combining horizontal with vertical springs; carrying front seat back springs over the top of the seat back; concealed mirror in the horn button on the more expensive cars, etc.

In other words, F. S. Spring, who was recently put in charge of the Hudson Motor Car Company's body design division, has applied to a high production car those details and niceties of finish and appointment which he has been accustomed to work out in his former capacity as designer for one of the leading custom body builders.



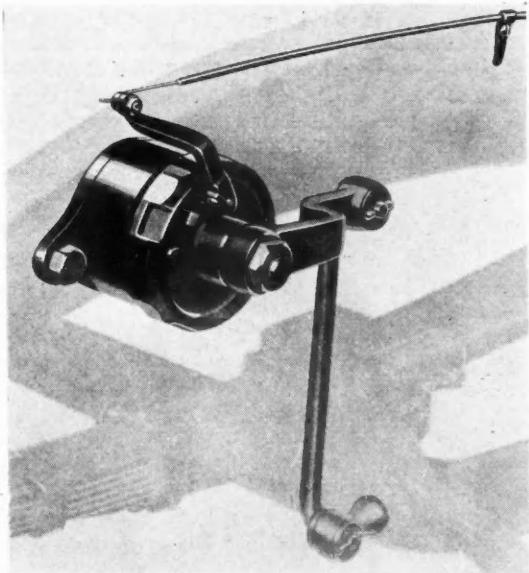
Front end of the new Hudson Eight. Note the attention given to detail finish in the sheet metal work. Headlamps are also new



# Chassis, Precisely-Engineered Bodies

General body lines are also new, it will be noted from the accompanying illustrations, although they retain the characteristic appearance of former Hudson-Essex cars. In general the new Hudson and Essex body lines seem to be a development of the 1931 Club Sedan lines, with the sloping windshield and absence of a pronounced exterior sun-visor, more streamlined body lines, etc., found on these cars during the past year. Modified exterior visors are found on the new cars, while interior sun-visors are standard on some models in addition.

Reverting to the chassis, the new frame structure is striking. The central X-member, through which passes the propeller shaft, and the forward extension of the maximum side-rail depth are credited with imparting considerable added stiffness to this assembly. Furthermore, the drop in the frame has been increased, reflected in lowering the bodies materially. A cut-out in the rear kick-up cross-member provides clearance for the axle housing. A heavier cross-member is located at the rear engine supports for added front end stiffness. A full box section cross-member is employed at the front end for added rigidity at this point, and considerable work has been done on strengthening fender and headlamp frame bracket. Outriggers are provided for body mounting as well as for running boards to reduce the number of holes to be punched in the main side rail.



Hudson left front ride control

Transmission parts have been assembled here to show the location of the synchronizer mechanism, the helical constant-mesh gears for quiet second speed, and the free-wheeling unit back of the transmission

With the strengthening of the front end of the chassis structure to reduce movement, the radiator with its large inertia mass has been tied into the body instead of to the frame to reduce relative movement.

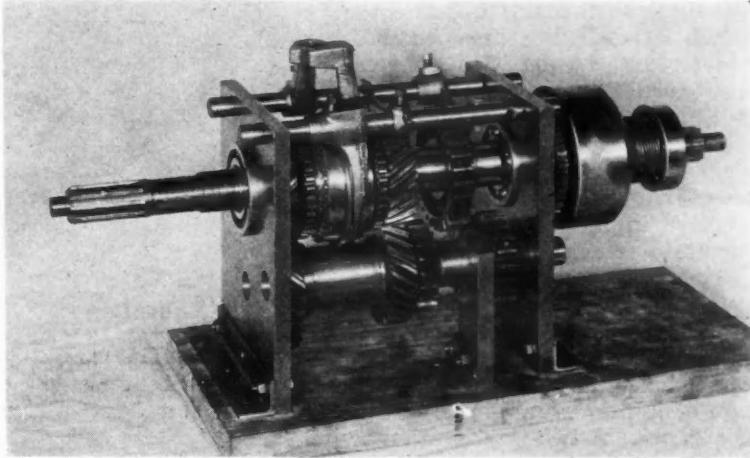
This fits in well with the structural changes in the bodies. These are of more all-steel construction even than formerly, but instead of relying on the panels at the cowl, etc., to carry some of the body strains, the latter are absorbed by a system of interior steel framing of box girder construction, to which the panels are attached, largely as a covering.

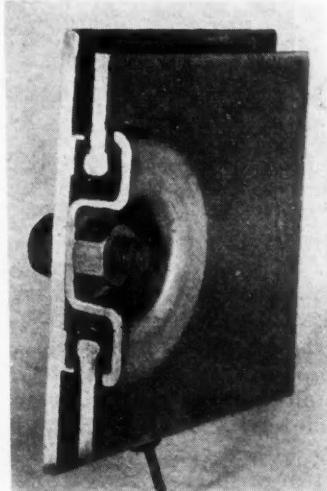
Engine mounting is of the four-point type, rubber insulated front and rear. At each point of support there are two rubber grommets instead of one, or a total of eight for the mounting system.

## Mechanical Data

Following are additional new specifications not included in accompanying article:

|                              | Hudson 8     | Essex 6          |
|------------------------------|--------------|------------------|
| Max. horsepower              | 101-3600     | 70-3200          |
| Compression ratio            | 5.8:1        | 5.5:1            |
| Bore and stroke              | 3 by 4 1/2   | 2 15/16 by 4 3/4 |
| Piston displacement          | 254.4        | 193.14           |
| Radiator capacity            | 19 qt.       | 17 qt.           |
| Compression rings            | 2 1/8 in.    | 2 1/8 in.        |
| Oil rings, upper             | 1/8 in.      | 1/8 in.          |
| Lower                        | 3/16 in.     | 3/16 in.         |
| Gas tank capacity            | 16 gal.      | 12 gal.          |
| Max. frame depth             | 8 in.        | 7 7/8 in.        |
| Frame thickness, stock       |              |                  |
| 126 & 132 in. W.B., 3/16 in. |              | none             |
| 119 in.                      | 5/32         | 5/32             |
| 113 in.                      | none         | 1/8 in.          |
| Brake drum diameter          | 13 in.       | 11 in.           |
| Lining width                 | 13/4 in.     | 13/4 in.         |
| Lining length per wheel      | 27 13/16 in. | 23 13/16 in.     |





Four-point engine rubber mounting is used on the 1932 Hudson-Essex models, in the form shown here, in cutaway

Power has been increased in the Essex engine by a  $\frac{1}{4}$ -in. increase in stroke and a  $\frac{1}{16}$ -in. increase in bore. In the Hudson a proportionate gain has been achieved by enlarging the bore  $\frac{1}{8}$  in. Combustion chambers have been modified somewhat to enable retention of relatively high compression ratios with the larger bores of the engines. Water jacket space over the combustion chamber has been increased in size.

New aluminum alloy pistons having an 18 per cent lower coefficient of expansion and 10 per cent less weight are used, it is stated, these pistons being cam ground. Two compression and two oil rings are used as last year, but the former are only  $\frac{1}{8}$  in. wide, while the first oil ring is also  $\frac{1}{8}$  and the lowest ring  $\frac{3}{16}$  in. wide.

Flanges on the connecting rods have been widened  $\frac{1}{8}$  in. to correspond with the increased power. Two crankcase ventilator outlets are used on the Hudson, compared with one on the Essex. Breathing capacity has been increased in the intake manifold with a thermostatically controlled heat chamber. A spring-balanced butterfly valve which opens as soon as the motor starts prevents flooding of the intake manifold. A combination intake silencer, air cleaner and flame arrester is found on both cars.

A vacuum system fuel feed is retained, Hudson engineers state, because it is less troublesome than other types of feed in connection with the problem of vapor lock. The tank is mounted on the dash at the side opposite the exhaust. Connecting lines to the carburetor are covered with loom as heat insulator. The Essex carries a 12-gal. and the Hudson a 16-gal. gasoline tank.

A double-breaker distributor is carried on the Hudson, provided with a graduated scale for timing, indicating advance in inches on the flywheel, to facilitate service adjustment. Both starter motors and batteries have been increased in capacity, and new Autolite "super-coils" are provided for easier starting. Startix is standard equipment. The ignition key thus takes care of ignition, cranking and the electric gages. A two-way ignition switch

is provided, however, so that the ignition and gages can be turned on without putting the automatic starter into operation.

A larger generator is provided to take care of decreased charging possibly due to free wheeling. A new rubber type of torsional vibration damper has been adopted, with the rubber bolted rather than bonded to the plates. Rubber is also used for the exhaust pipe supports for silencing, and two muffler chambers are now used to take out the characteristic high and low speed notes of the exhaust respectively.

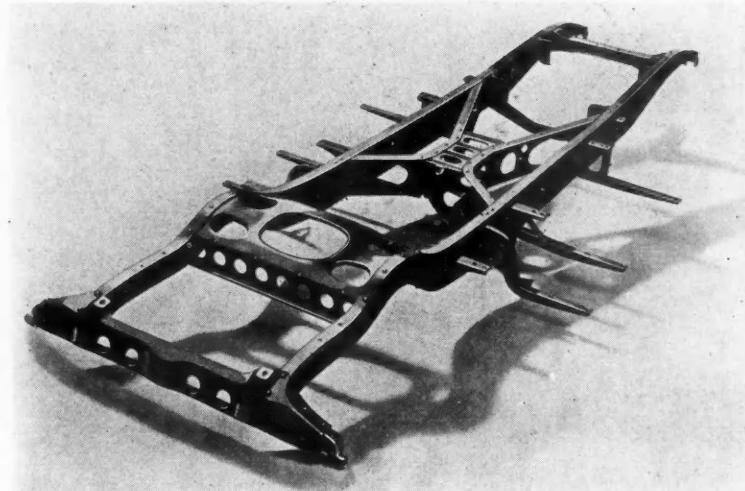
In the clutch the oil sealing has been improved, largely through the use of leather seals. The aluminum alloy plate adopted last year is continued, with circumferentially mounted springs between plate and hub to absorb shocks and dampen vibration.

Synchronizing and silent-second helical gears are now provided in the Hudson-Essex transmissions. Pressure between the two halves of the synchronizing cone clutches for either second-speed or direct-drive engagement is regulated by a spring loaded ball locked in the synchronizer carrier housing. The latter is of two-piece construction, the outer unit being actuated by the gearshift lever, and carrying the engaging teeth, while the inner carries the cone clutches. The two halves are held together by the aforementioned spring-loaded ball locks until sufficient pressure is ap-

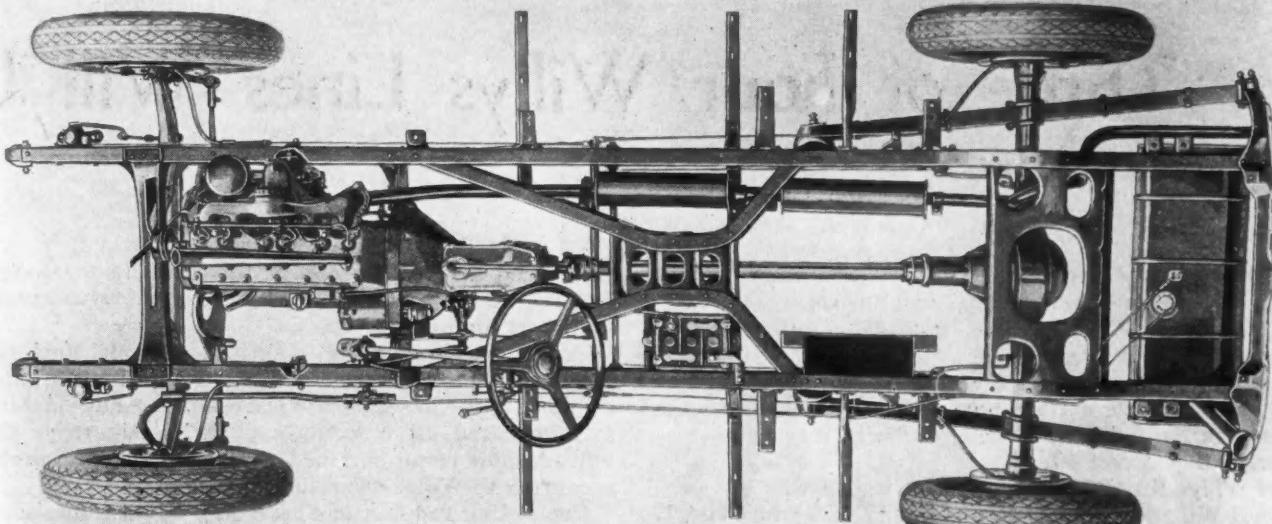
## Prices

Hudson-Essex prices on the 1932 line follow:

|                      |  |         |
|----------------------|--|---------|
| Essex Super 6        | 4-p. coupe .....                             | \$1,045 |
| Business coupe ..... | Standard sedan .....                         | 1,095   |
| Coach .....          | Special coupe .....                          | 1,115   |
| Town sedan .....     |  |         |
| 4-p. coupe .....     | Sterling Series, 126 in. w.b. ....           |         |
| Standard sedan ..... | Suburban .....                               | 1,275   |
| Spec. coupe .....    | Special sedan .....                          | 1,295   |
| Special sedan .....  |  |         |
|                      | Hudson Standard Series,<br>119 in. w.b. .... |         |
|                      | Major Series, 132 in. w.b. ....              |         |
|                      | Touring-sedan .....                          | 1,445   |
|                      | Brougham .....                               | 1,495   |
|                      | Club sedan .....                             | 1,495   |
|                      | 7-p. sedan .....                             | 1,595   |
|                      |  |         |



Both Hudson and Essex frames now have X-type cross-members amidships. Note how far forward the maximum depth of the side rail is carried. The drop is also deeper



**Top view of the Essex chassis (the Hudson is similar). Note that the fuel lines are carried outside the frame channel. There is a double "neutrotone" muffler to decrease exhaust noise. The shock absorber adjusting connections are also shown here**

plied on the shift lever to overcome the lock-spring pressure.

To the rear of the transmission is the free-wheeling unit, offered last year at extra cost, but standard on the 1932 models. A change in the design provides automatic reversion to free wheeling when shifting into a forward speed again after having locked out the free-wheeling unit automatically in engaging reverse.

The free-wheeling lock-out control is located on the gearshift lever, a cable connecting the shift lever ball to the lock-out mechanism. To lock out free wheeling a button in the top of the shift lever is depressed and the shift lever ball pushed down until it catches. Depressing the button once more and pulling up on the shift lever ball puts the car back into free wheeling.

A lower gear ratio (1.62 to 1 as compared with 1.94 in 1931) is used for second speed on the 1932 models, giving a higher top speed in second gear. Low gear ratio has similarly been reduced from 2.91 to 2.44 to 1. Reverse ratio is 3.26 to 1. No basic change has been made in Hudson axle ratios, so that the increased power may be reflected in increased acceleration as well. Axle ratios are 4 7/11 and 5.1 to 1 optionally on Essex cars as compared with 5.4 and 5.1 to 1 formerly, reflected in lower engine speed per mile.

A minor change in the rear axles consists of a new leather oil seal at the wheel ends to retain the axle lubricant. Thrust buttons are provided on the axle shaft for end thrust. Rear axle housings which formerly had malleable-casting brake spiders riveted to pressed-steel housings are now of flanged tubular construction; 1932 axles are of the one-piece type butt welded at the vertical center line.

Brake capacity has been increased on both cars, 30 per cent on the Hudson and 17 per cent on the Essex, to take care of increased brake application with free wheeling, etc. Two-shoe Bendix brakes are retained, but with cable operation on the 1932 models.

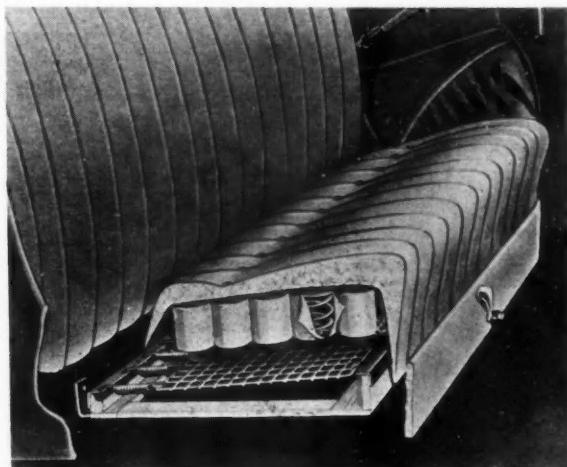
In the steering gear the Pitman arm has been short-

ened to reduce the leverage from road shocks and thereby wheel-fight. The steering cross or tie rod is full rubber mounted on oilless bearings. This is also intended to help damp out vibration on rough surface roads. Steering ratio is increased to 15 to 1.

Larger tires are used throughout, with 17-in. wheels on the Hudsons and 18-in. wheels on the Essex. Tire sections are 6.50 in. for the 132-in. and 126-in. wheelbase Hudsons, 6.00 in. on the 119-in. wheelbase Hudson and 5.25 for the 113-in. wheelbase Essex.

Important in the chassis developments, of course, is the adoption of manually adjustable shock absorbers. These are of the variable orifice type with a push-pull button on the dash to regulate the shocks to the amount of resistance desired. For a boulevard ride practically all the liquid is by-passed through an enlarged opening. With this arrangement as standard equip-

(Turn to page 76, please)



**The horizontal and vertical spring seat construction is aimed at rider comfort**

# Three of Four Willys Lines Will List

**F**OUR chassis models, a poppet-valve six and eight, and two six-cylinder Knight engine cars represent the Willys-Overland line for 1932. In order of price class these are:

6-90 Willys-Overland Six on 113 in. wheelbase. The 110 in. wheelbase former model 97 has been dropped. Prices on the 6-90 are expected to be in the neighborhood of the former 97.

95 Willys-Knight Six on a 113 in. wheelbase.

88-D Willys-Overland Eight on a 121 in. wheelbase.  
66-D Willys-Knight Big Six on a 121 in. wheelbase.

Price reductions are expected on virtually the entire Willys-Overland line, with the eight listing under \$900. This particular car, with its 121 in. wheelbase, 80 hp. engine and relatively light weight, represents one of the best values ever offered by Willys-Overland.

The 6-90 will be the leader of the line in the lowest priced bracket. In comparison with the model 98, which it replaces, the outstanding changes are:

Internal changes in the engine to further increase reliability

- Adoption of a spring damper in the clutch
- Larger brakes with reduced pedal pressure
- Smaller wheels and larger tires
- V-type radiator with grille and concealed filler
- Hood 2 in. longer
- Visorless windshield

Bodies insulated against noise and temperature.

In the engine piston pins have been increased in diameter to 15/16 in. and now float in the piston, as well as in the upper end of the rod, the retainer being in the form of a snap ring. This is intended to reduce chances of piston distortion and piston pin clatter.

The cylinder blocks are now cast from chrome nickel iron instead of grey iron, to increase life and reduce wear in the cylinder bores and valve seats, etc. Its use

has permitted an increase in valve spring tension to 100 lb., thereby guarding better against valve spring thrash at high engine speeds.

A Perfect Circle 85 oil ring is now used. This and a reduction in the number of holes connecting the valve chamber to the lower part of the crankcase have materially improved oil economy—approximately twice the mileage now being obtained per gallon than formerly, according to Willys-Overland.

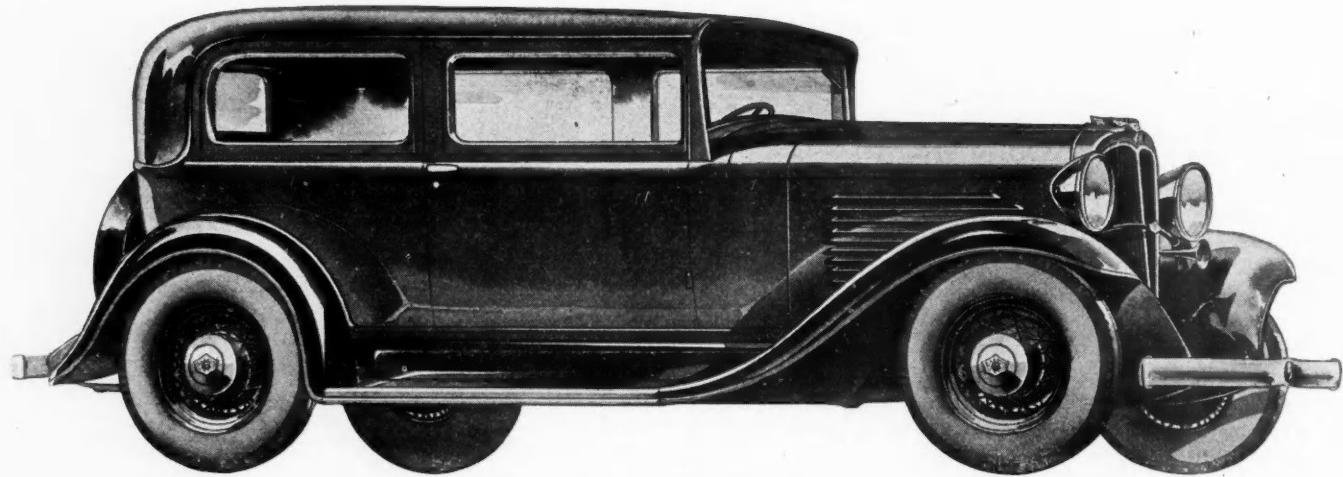
Connecting rod sections have been slightly increased for additional rigidity. Valve tappets are now made from chilled electric furnace iron for greater uniformity and to increase tappet life. Otherwise engines remain unchanged.

Chassis units except as previously noted remain unchanged over the 98-D. Increases in brake dimensions are traceable to the use of free wheeling, which is standard at extra cost on the Willys-Overland Six as it was on the Willys Sixes for 1931. Drums are now 1 in. larger in diameter (12 in. as compared with 11 in.). Pedal pressure is reduced, it is claimed, by approximately 30 per cent.

A push-pull button control for the free-wheeling unit is now located on the instrument board. Wheels are now 18 in. in diameter as against 19 in. formerly, with tire section increased from 5.00 to 5.25 in. This results in slightly lower overall car height.

The radiator is similar in appearance to that used on the 121 in. wheelbase models last year. The filler cap is located under the hood, with a narrow, low chrome ornament on top of the lacquered shell. Baffling of the upper header tank has been improved to prevent pumping water out of the overflow pipe. Provision is made for installation of thermostatically operated radiator shutters, if desired.

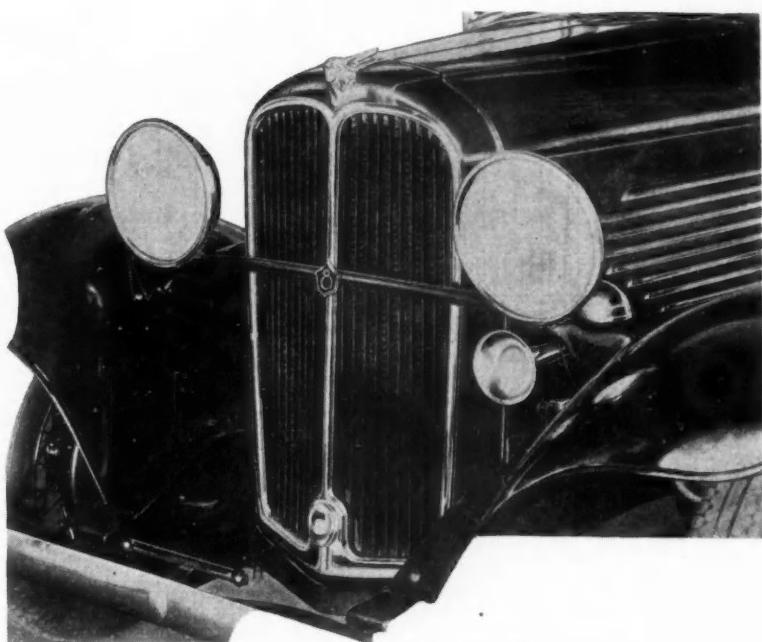
In the interiors mohair instead of cloth trim is now



Willys-Knight Model 95 coupe

# Under \$900

**Chrome nickel engine blocks used to increase life and reduce wear. Free wheeling, lacquered radiator shell and longer hoods on all 1932 models**



This front view of the eight is characteristic of the new line

used. Cushions are of the form-fitting type with pleats and buttons instead of the plain type used during 1931. Trim moldings and instrument boards are in walnut finish on closed models.

Body insulation consists of insulating pads cemented to the inside of the cowl, rear of the dash, door and rear body panels. Insulating mats have also been placed under the toeboard and floorboard mats in the front compartment. A full line of bodies is now available on this wheelbase.

On the 88-D Willys-Overland Eight there is now provided a full line of bodies. Basic chassis design is unchanged, the major refinements being an increase in brake size, lower pedal pressure, larger tires, smaller wheels, wider rear springs. Body changes (including insulation) made on the series 6-90 are also found on the 8-88. Custom models of the eight-cylinder series carry the free-wheeling unit as standard equipment.

Brakes now have 13 in. drums as against 12 in. formerly. A  $\frac{1}{4}$  in. increase in rear spring width to 2 in. is accompanied with the encasing of the front end of the rear spring in rubber. This together with larger hydraulic shock absorbers materially increases the rear end stability at high speeds.

Wheels as on the 6-90 are 18 in. in diameter. Six inch section tires are standard equipment on "custom" models, with 5.50 section tires on standard body types.

As was the case last year, both the 113 in. and 121 in. wheelbase models are available with Knight six-cylinder sleeve valve engines. In these cars the same changes are to be found as in poppet-valve series except for the engines. Tires on the series 95 Knight are larger, however, than on the 90, the section having been increased from 5.00 to 5.50 in., together with a reduction in wheel diameter from 19 to 18 in.

Spare tires on the 95, as on the 90 and 88-D, are in every case rear mounted, there being no fender wells.

The 66-D, as last year, is made only in two body models, a sedan and a victoria coupe. A ride selector has been added as standard equipment. Powerplants are unchanged from last year except that the free-wheel-

ing unit is now standard equipment at no extra cost. Chassis changes applying to the 88-D also apply to this line, except for the use of 17 in. wheels and 6.00 in. tires as against the 6.00/18 in. tires used during 1931.

Two spare wire wheels, mounted in fender wells, are supplied on the 66-D models. The automatic radiator shutters have alternating strips of chrome plating and lacquer, improving their appearance.

Hood ventilator doors are used instead of louvers. Running board mats are of deep molded rubber, with chrome-plated insert strips. A trunk rack is standard equipment. In the interior there are to be found numerous detail refinements including a cord-wrapped solid robe rail, a carpet-covered foot rest, carpet in the front compartment as well as the rear, improved mohair trim, deeper cushion back, wider cushions, strap type assist loops, natural wood finish smoking sets in both sides of rear compartment, etc. Complete body insulation characterizes these models also.

The ride selector used on the 66-D consists of four double-acting Monroe hydraulic shock absorbers, adjustable by means of a lever in the front compartment according to road conditions, etc.

An interesting touch found on the de luxe bodies on all chassis lines is the use of chrome-plated beading instead of leather anti-squeak at sheet metal joints, as between body and fenders, etc. This beading is clamped over felt insulating strips and gives a neater finished appearance. On these models, horns and headlamps are also chrome-plated.

1932 Willys-Overland list prices follow:

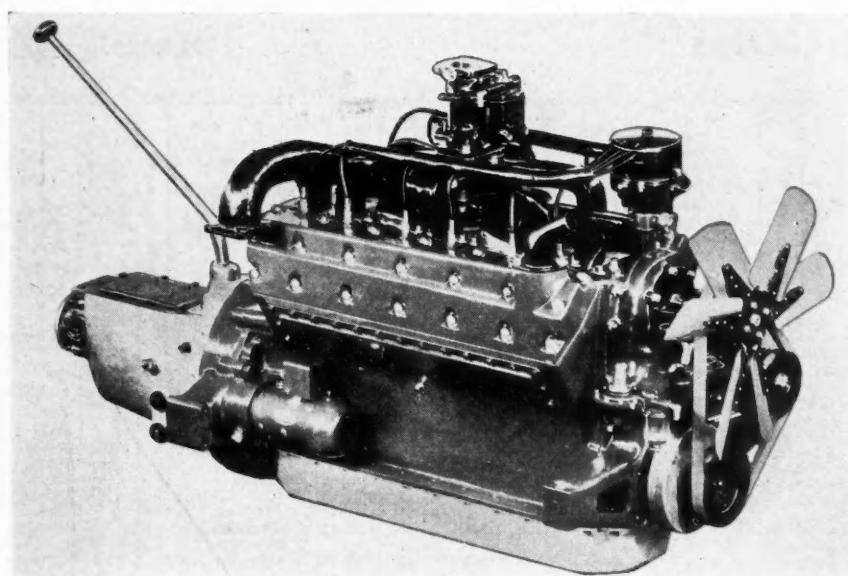
| Willys-Overland 6        | New Price | New Price             |        |
|--------------------------|-----------|-----------------------|--------|
| Sedan .....              | \$695     | Custom Sedan .....    | \$1095 |
| Coach .....              | 615       | Willys-Knight 95      |        |
| 2-p. Coupe .....         | 615       | Sedan .....           | 895    |
| 2-4-p. Coupe .....       | 645       | Coach .....           | 845    |
| 2-p. Roadster .....      | 515       | 2-p. Coupe .....      | 845    |
| 2-4-p. Roadster .....    | 695       | 2-3-p. Coupe .....    | 875    |
| <b>Willys-Overland 8</b> |           |                       |        |
| Sedan .....              | 895       | Willys-Knight 66-D    |        |
| 2-p. Roadster .....      | 795       | Custom Sedan .....    | 1395   |
|                          |           | Custom Victoria ..... | 1245*  |

# Motor Car, Price, Weight

| BODY,<br>MAKE<br>AND<br>MODEL | No. of Passengers |       |             |           | No. of Passengers    |                        |                       |                    | No. of Passengers |             |           |                      | No. of Passengers      |                       |                   |                 | No. of Passengers |                    |                      |                        |                       |                    |                  |      |      |      |     |      |    |
|-------------------------------|-------------------|-------|-------------|-----------|----------------------|------------------------|-----------------------|--------------------|-------------------|-------------|-----------|----------------------|------------------------|-----------------------|-------------------|-----------------|-------------------|--------------------|----------------------|------------------------|-----------------------|--------------------|------------------|------|------|------|-----|------|----|
|                               | No. of Doors      | Price | Net Weight* | Wheelbase | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass | No. of Doors       | Price             | Net Weight* | Wheelbase | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass | No. of Doors      | Price           | Net Weight*       | Wheelbase          | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass |                    |                  |      |      |      |     |      |    |
| AUBURN<br>8-100 Std.          | 2                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | 370-B<br>Fisher    | 2                 | 3595        | 134       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 2                 | 112 <sup>1/2</sup> | 4.62                 | W                      | Conv. Coupe.          | 3-5                | 2                | 132  | 4.54 | A    |     |      |    |
| Speedster                     | 2                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | Roadster.....      | 2                 | 2495        | 134       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 112 <sup>1/2</sup> | 4.62                 | W                      | Club Sedan.....       | 5                  | 4                | 132  | 4.73 | A    |     |      |    |
| Coupe                         | 2                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | Coupe.....         | 2                 | 2495        | 134       | 4.80                 | CK                     | T                     | Cus. Six.....     | 4               | 2                 | 132                | 4.73                 | A                      | Vic. Bro'm.....       | 4                  | 2                | 132  | 4.73 | A    |     |      |    |
| Cabriolet                     | 2-4               | 2     | 127         | 4.7       | AM                   | O                      | O                     | Sedan.....         | 5                 | 4355        | 134       | 4.80                 | CK                     | T                     | Roadster.....     | 2-4             | 2                 | 112 <sup>1/2</sup> | 4.62                 | W                      | Sedan.....            | 5                  | 4                | 132  | 4.73 | A    |     |      |    |
| Phaeton Sed.                  | 5                 | 4     | 127         | 4.7       | AM                   | O                      | O                     | Conv. Coupe.....   | 2                 | 2645        | 134       | 4.80                 | CK                     | T                     | Conv't Coupe..... | 2-4             | 2                 | 112 <sup>1/2</sup> | 4.62                 | W                      | Sedan.....            | 5                  | 4                | 132  | 4.73 | A    |     |      |    |
| Brougham                      | 5                 | 5     | 127         | 4.7       | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4365        | 140       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 112 <sup>1/2</sup> | 4.62                 | W                      | Limousine.....        | 7                  | 4                | 132  | 4.73 | A    |     |      |    |
| Sedan                         | 5                 | 4     | 127         | 4.7       | AM                   | O                      | O                     | Spec. Phaeton..... | 5                 | 43795       | 140       | 4.80                 | CK                     | T                     | Conv't Sedan..... | 5               | 5                 | 112 <sup>1/2</sup> | 4.62                 | W                      | GRAHAM                |                    |                  |      |      |      |     |      |    |
| Sedan                         | 7                 | 4     | 136         | 4.7       | AM                   | O                      | O                     | Spt. Phaeton.....  | 5                 | 43945       | 140       | 4.80                 | CK                     | T                     | DE VAUX           |                 |                   |                    |                      |                        | Six.....              |                    |                  |      |      |      |     |      |    |
| 8-100A Cus.                   |                   |       |             |           |                      |                        |                       | A.W. Phaeton.....  | 5                 | 41915       | 140       | 4.80                 | CK                     | T                     | Std. Coupe.....   | 2               | 2                 | 685                | 2615                 | 113                    | 3.9                   | AM                 | Town Sedan.....  | 5    | 4    | 765  | 113 | 4.45 | AM |
| Speedster                     | 2                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | Coupe.....         | 2                 | 23495       | 134       | 4.80                 | CK                     | T                     | Spi. Coupe.....   | 2-4             | 2                 | 748                | 2730                 | 113                    | 4.4                   | WM                 | Sedan.....       | 5    | 4    | 795  | 113 | 4.45 | AM |
| Coupe                         | 2                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | Spec. Sedan.....   | 5                 | 3745        | 140       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 685                | 2785                 | 113                    | 4.4                   | AM                 | Std. 8.....      |      |      |      |     |      |    |
| Brougham                      | 5                 | 2     | 127         | 4.7       | AM                   | O                      | O                     | Town Sedan.....    | 5                 | 43795       | 140       | 4.80                 | CK                     | T                     | Spi. Sedan.....   | 5               | 4                 | 745                | 2840                 | 113                    | 4.4                   | WM                 | Bus. Coupe.....  | 2    | 2    | 995  | 123 | 4.3  | WM |
| Sedan                         | 5                 | 4     | 127         | 4.7       | AM                   | O                      | O                     | Town Cab.....      | 7                 | 43845       | 140       | 4.80                 | CK                     | T                     | Del. Coupe.....   | 2-4             | 2                 | 795                | 2720                 | 113                    | 4.4                   | WM                 | Coupe.....       | 2-4  | 2    | 1045 | 123 | 4.3  | WM |
| Cabriolet                     | 2-4               | 2     | 127         | 4.7       | AM                   | O                      | O                     | Imperial.....      | 7                 | 43995       | 140       | 4.80                 | CK                     | T                     | Del. Sedan.....   | 5               | 4                 | 795                | 2855                 | 113                    | 4.4                   | WM                 | Sedan.....       | 5    | 4    | 1045 | 123 | 4.3  | WM |
| Phaeton Sed.                  | 5                 | 4     | 127         | 4.7       | AM                   | O                      | O                     | Fleetwood.....     |                   |             |           |                      |                        |                       | Cus. Coupe.....   | 2-4             | 2                 | 845                | 2845                 | 113                    | 4.4                   | WM                 | Del. 8.....      |      |      |      |     |      |    |
| Sedan                         | 7                 | 4     | 136         | 4.7       | AM                   | O                      | O                     | Sedan.....         | 5                 | 44095       | 140       | 4.80                 | CK                     | T                     | Spec. Sedan.....  | 5               | 4                 | 845                | 2955                 | 113                    | 4.4                   | WM                 | Bus. Coupe.....  | 2    | 2    | 1070 | 123 | 4.3  | WM |
| 12-160 Std.                   |                   |       |             |           |                      |                        |                       | A.W. Phaeton.....  | 5                 | 41915       | 140       | 4.80                 | CK                     | T                     | DODGE             |                 |                   |                    |                      |                        | Conv't Coupe.....     | 2-4                | 2                | 1120 | 123  | 4.3  | WM  |      |    |
| Speedster                     | 2                 | 2     | 132         | 4.83      | AM                   | O                      | O                     | Roadster.....      | 2                 | 2495        | 134       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 795                | 295                  | 183                    | 4.30                  | W                  | Sedan.....       | 5    | 4    | 1120 | 123 | 4.3  | WM |
| Coupe                         | 2                 | 2     | 132         | 4.83      | AM                   | O                      | O                     | Coupe.....         | 2                 | 2495        | 140       | 4.80                 | CK                     | T                     | Bus. Coupe.....   | 2               | 2                 | 795                | 2928                 | 183                    | 4.30                  | W                  | Conv. Sedan..... | 5    | 4    | 1120 | 123 | 4.3  | WM |
| Cabriolet                     | 2-4               | 2     | 132         | 4.83      | AM                   | O                      | O                     | Limousine.....     | 7                 | 44445       | 140       | 4.80                 | CK                     | T                     | Coupe.....        | 2-4             | 2                 | 835                | 2995                 | 183                    | 4.30                  | W                  | Great 8.....     |      |      |      |     |      |    |
| Phaeton Sed.                  | 5                 | 4     | 132         | 4.83      | AM                   | O                      | O                     | Town Cab.....      | 5                 | 42795       | 140       | 4.80                 | CK                     | T                     | Conv't Coupe..... | 2-4             | 2                 | 835                | 2995                 | 183                    | 4.30                  | W                  | 119.....         |      |      |      |     |      |    |
| Brougham                      | 5                 | 2     | 132         | 4.83      | AM                   | O                      | O                     | Town Cab.....      | 7                 | 44945       | 140       | 4.80                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 845                | 3094                 | 183                    | 4.60                  | W                  | Bus. Coupe.....  | 2    | 2    | 995  | 119 | 4.64 | AM |
| Sedan                         | 5                 | 4     | 132         | 4.83      | AM                   | O                      | O                     | Lim. Bro'm.....    | 7                 | 44945       | 140       | 4.80                 | CK                     | T                     | Conv't Sedan..... | 5               | 4                 | 845                | 3094                 | 183                    | 4.60                  | W                  | Conv. Coupe..... | 2-4  | 2    | 1045 | 119 | 4.64 | AM |
| 12-160 Cus.                   |                   |       |             |           |                      |                        |                       | 452-B.....         |                   |             |           |                      |                        |                       | Eight.....        |                 |                   |                    |                      |                        | Coach.....            | 5                  | 2                | 1025 | 119  | 4.64 | AM  |      |    |
| Speedster                     | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Roadster.....      | 2                 | 2495        | 143       | 4.64                 | CK                     | T                     | Coupe.....        | 2-4             | 2                 | 1115               | 3373                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | Great 8.....     |      |      |      |     |      |    |
| Coupe                         | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Coupe.....         | 2                 | 2495        | 143       | 4.64                 | CK                     | T                     | Conv't Coupe..... | 2-4             | 2                 | 1115               | 3373                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | 119.....         |      |      |      |     |      |    |
| Cabriolet                     | 2-4               | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Conv. Coupe.....   | 2                 | 2495        | 143       | 4.64                 | CK                     | T                     | Coupe.....        | 2-4             | 2                 | 1115               | 3373                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | 119.....         |      |      |      |     |      |    |
| Phaeton Sed.                  | 5                 | 4     | 132         | 3.0°      | AM                   | O                      | O                     | Fisher.....        |                   |             |           |                      |                        |                       | Sedan.....        | 5               | 4                 | 1145               | 3115                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | 119.....         |      |      |      |     |      |    |
| Brougham                      | 5                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 44695       | 149       | 4.64                 | CK                     | T                     | Conv't Sedan..... | 5               | 4                 | 1145               | 3115                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | 119.....         |      |      |      |     |      |    |
| Sedan                         | 5                 | 4     | 132         | 3.0°      | AM                   | O                      | O                     | Spec. Phaeton..... | 5                 | 44795       | 149       | 4.64                 | CK                     | T                     | DODGE             |                 |                   |                    |                      |                        |                       |                    |                  |      |      |      |     |      |    |
| 12-160 Std.                   |                   |       |             |           |                      |                        |                       | Spt. Phaeton.....  | 5                 | 44945       | 149       | 4.64                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 1145               | 3115                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | DODGE            |      |      |      |     |      |    |
| Speedster                     | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | A.W. Phaeton.....  | 5                 | 45195       | 149       | 4.64                 | CK                     | T                     | Sedan.....        | 5               | 4                 | 1145               | 3115                 | 191 <sup>1/2</sup>     | 3.91                  | W                  | du PONT G        |      |      |      |     |      |    |
| Coupe                         | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Chevrolet          |                   |             |           |                      |                        |                       | Roadster.....     | 2               | 2                 | 4300               | 141                  | WS                     | T                     | Touring Sedan..... | 5                | 4    | 1445 | 132  |     |      |    |
| Cabriolet                     | 2-4               | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Roadster.....      | 2                 | 475         | 2275      | 109                  | 4.1                    | WO                    | T                 | Club Sedan..... | 5                 | 4                  | 1495                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Phaeton                       | 5                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4510        | 2370      | 109                  | 4.1                    | WO                    | T                 | Limousine.....  | 5                 | 4                  | 1495                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Bus. Coupe                    | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4510        | 2370      | 109                  | 4.1                    | WO                    | T                 | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Std. Cus.                     | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4510        | 2370      | 109                  | 4.1                    | WO                    | T                 | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Del. Cus.                     | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4510        | 2370      | 109                  | 4.1                    | WO                    | T                 | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Cabriolet                     | 2                 | 2     | 132         | 3.0°      | AM                   | O                      | O                     | Phaeton.....       | 5                 | 4510        | 2370      | 109                  | 4.1                    | WO                    | T                 | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| AUSTIN                        |                   |       |             |           |                      |                        |                       | Phaeton.....       | 5                 | 45195       | 149       | 4.64                 | CK                     | T                     | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Roadster                      | 2                 | 2     | 1050        | 75        | 5.25                 | DM                     | N                     | Chassis.....       |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Bus. Coupe                    | 2                 | 2     | 1120        | 75        | 5.25                 | DM                     | N                     | Chassis.....       |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Std. Cus.                     | 2                 | 2     | 1130        | 75        | 5.25                 | DM                     | N                     | Chassis.....       |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Del. Cus.                     | 2                 | 2     | 1140        | 75        | 5.25                 | DM                     | N                     | Chassis.....       |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Cabriolet                     | 2                 | 2     | 1140        | 75        | 5.25                 | DM                     | N                     | Chassis.....       |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| BUCK                          |                   |       |             |           |                      |                        |                       | BUICK              |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| 32-50                         |                   |       |             |           |                      |                        |                       | CHEVROLET          |                   |             |           |                      |                        |                       | Limousine.....    | 5               | 4                 | 1595               | 132                  |                        |                       |                    |                  |      |      |      |     |      |    |
| Spt. Phaeton                  | 5                 | 4     | 1155        | 114       | 4.6                  | C                      | O                     | Roadster.....      | 2                 | 2           | 475       | 2275                 | 109                    | 4.1                   | WO                | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Conv. Rdster                  | 2-4               | 2     | 1080        | 114       | 4.6                  | C                      | O                     | Phaeton.....       | 5                 | 4           | 510       | 2370                 | 109                    | 4.1                   | WO                | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Conv. Phaeton                 | 5                 | 2     | 1080        | 114       | 4.6                  | C                      | O                     | Conv. Coupe.....   | 2-4               | 2           | 495       | 2430                 | 109                    | 4.1                   | WO                | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Bus. Coupe                    | 2                 | 2     | 1250        | 3275      | 114                  | 4.6                    | AK                    | Conv. Cab.         | 2-4               | 2           | 615       | 2610                 | 109                    | 4.1                   | WO                | Limousine.....  | 5                 | 4                  | 1595                 | 132                    |                       |                    |                  |      |      |      |     |      |    |
| Sedan                         | 5                 | 4     | 995         | 3450      | 114                  | 4.6                    | CK                    | Coach.....         | 2                 | 2           |           |                      |                        |                       |                   |                 |                   |                    |                      |                        |                       |                    |                  |      |      |      |     |      |    |

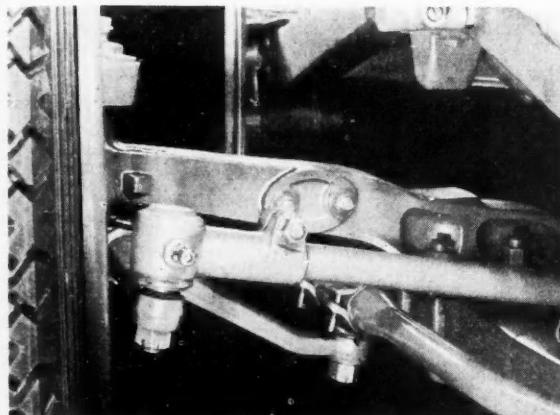
# and Body Specifications

| BODY, MAKE AND MODEL |              |        |             |           |                      |                        |                       |                   |              |        |             | BODY, MAKE AND MODEL |                      |                        |                       |                   |              |       |             |           |                      |                        |                       | BODY, MAKE AND MODEL |              |         |             |               |                      |                        |                       |        |      |     |      |   |   |
|----------------------|--------------|--------|-------------|-----------|----------------------|------------------------|-----------------------|-------------------|--------------|--------|-------------|----------------------|----------------------|------------------------|-----------------------|-------------------|--------------|-------|-------------|-----------|----------------------|------------------------|-----------------------|----------------------|--------------|---------|-------------|---------------|----------------------|------------------------|-----------------------|--------|------|-----|------|---|---|
| No. of Passengers    | No. of Doors | Price  | Net Weight* | Wheelbase | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass | No. of Passengers | No. of Doors | Price  | Net Weight* | Wheelbase            | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass | No. of Passengers | No. of Doors | Price | Net Weight* | Wheelbase | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass | No. of Passengers    | No. of Doors | Price   | Net Weight* | Wheelbase     | Rear Axle Gear Ratio | Wheels (Type and Make) | Non-Shatterable Glass |        |      |     |      |   |   |
| INCOLN 8             | 2-4          | 2      | 136         | 4.58      | WO                   | T                      | Spt. Phaeton.         | 5                 | 4 2650       | 4300   | 136½        | 4.69                 | WM                   | T                      | REO                   | 6-21              | 2            | 1195  | 121         | 4.07      | A                    | N                      | Sta. St. R. Br'm      | 5                    | 2 1795       | ... 135 | 4.31        | W             | T                    |                        |                       |        |      |     |      |   |   |
| opt. Touring         | 7            | 4      | 136         | 4.58      | WO                   | T                      | Spt. Phaeton.         | 5                 | 4 2950       | 4400   | 136½        | 4.69                 | WM                   | T                      | Coupe.                | 2                 | 2 995        | 121   | 4.07        | A         | N                    | State Sedan.           | 5                     | 4 1795               | ... 135      | 4.31    | W           | T             |                      |                        |                       |        |      |     |      |   |   |
| opt. Phaeton.        | 4            | 4      | 136         | 4.58      | WO                   | T                      | Touring               | 7                 | 4 2775       | 345    | 136½        | 4.69                 | DM                   | T                      | Sedan.                | 5                 | 4 995        | 3645  | 121         | 4.07      | A                    | N                      | State Con. Sed.       | 5                    | 4 1925       | ... 135 | 4.31        | W             | T                    |                        |                       |        |      |     |      |   |   |
| opt. Pha. TC.        | 4            | 4      | 136         | 4.58      | WO                   | T                      | Coupe.                | 2-4               | 2 2675       | 4475   | 136½        | 4.69                 | DM                   | T                      | Spt. Coupe.           | 2                 | 2 1110       | 121   | 4.07        | W         | N                    | Limousine.             | 7                     | 4 1890               | ... 135      | 4.31    | W           | T             |                      |                        |                       |        |      |     |      |   |   |
| Conv't Phae.         | 5            | 5      | 136         | 4.58      | WO                   | T                      | Coupe.                | 5                 | 2 2795       | 4505   | 136½        | 4.69                 | DM                   | T                      | Spt. Sedan.           | 5                 | 4 1110       | 121   | 4.07        | W         | N                    | State Sedan.           | 7                     | 4 1895               | ... 135      | 4.31    | W           | T             |                      |                        |                       |        |      |     |      |   |   |
| Coupe.               | 5            | 2      | 136         | 4.58      | WO                   | T                      | Coupe Rdstr.          | 2-4               | 2 2650       | 4420   | 136½        | 4.69                 | WM                   | T                      | 8-21                  |                   |              |       |             |           |                      | State Lim.             | 7                     | 4 1995               | ... 135      | 4.31    | W           | T             |                      |                        |                       |        |      |     |      |   |   |
| Town Sedan           | 4            | 4      | 136         | 4.58      | WO                   | T                      | Sedan.                | 5                 | 2 2685       | 4590   | 136½        | 4.69                 | WM                   | T                      | Coupe.                | 2                 | 2 1195       | 121   | 4.42        | A         | N                    | STUTZ LAA              | 5                     | 2 1620               | 4200         | 127½    | 4.75        | AM            | T                    |                        |                       |        |      |     |      |   |   |
| Sedan.               | 5            | 4      | 136         | 4.58      | WO                   | T                      | Club Sedan.           | 5                 | 4 2775       | 4555   | 136½        | 4.69                 | DM                   | T                      | Sedan.                | 5                 | 4 1195       | 3740  | 121         | 4.42      | A                    | N                      | Coupe.                | 2                    | 2 1620       | 4355    | 127½        | 4.75          | AM                   | T                      |                       |        |      |     |      |   |   |
| Coupe Jud.           | 2            | 2      | 136         | 4.58      | WO                   | T                      | Sedan.                | 7                 | 4 2885       | 4735   | 136½        | 4.69                 | DM                   | T                      | Spt. Sedan.           | 5                 | 4 1310       | 121   | 4.42        | W         | N                    | Sedan.                 | 5                     | 4 1620               | 4520         | 127½    | 4.75        | AM            | T                    |                        |                       |        |      |     |      |   |   |
| LeBaron Cab.         | 7            | 4      | 136         | 4.58      | WO                   | T                      | Touring               | 7                 | 4 3795       | 4760   | 142½        | 4.69                 | DM                   | T                      | Coupe.                | 2                 | 2 1565       | 3841  | 125         | 4.42      | AW                   | W                      | SV-16                 | 2                    | 2 3495       | 4595    | 134½        | 4.5           | AM                   | T                      |                       |        |      |     |      |   |   |
| Cellar. Cab.         | 7            | 4      | 136         | 4.58      | WO                   | T                      | Coupe.                | 5                 | 2 3725       | 4825   | 142½        | 4.69                 | DM                   | T                      | 6-25                  |                   |              |       |             |           |                      | Speedster.             | 4                     | 4 3795               | 4713         | 134½    | 4.5         | AM            | T                    |                        |                       |        |      |     |      |   |   |
| Conv't Coupe.        | 4            | 2      | 136         | 4.58      | WO                   | T                      | Coupe.                | 5                 | 2 3850       | 4825   | 142½        | 4.69                 | DM                   | T                      | Victoria.             | 5                 | 2 1565       | 3880  | 125         | 4.42      | AM                   | W                      | Torpedo.              | 2                    | 2 3595       | 4620    | 134½        | 4.25          | AM                   | T                      |                       |        |      |     |      |   |   |
| Conv't Sedan.        | 5            | 4      | 136         | 4.58      | WO                   | T                      | Coupe Rdstr.          | 2-4               | 2 3750       | 4825   | 142½        | 4.69                 | WM                   | T                      | Elite Coupe.          | 2-4               | 2 1650       | 4030  | 125         | 4.42      | WM                   | W                      | Victoria.             | 5                    | 2 2695       | 4950    | 134½        | 4.75          | AM                   | T                      |                       |        |      |     |      |   |   |
| Vill. Bro'm.         | 5            | 4      | 136         | 4.58      | WO                   | T                      | Sedan.                | 5                 | 4 3845       | 5045   | 142½        | 4.69                 | DM                   | T                      | Elite Victoria.       | 5                 | 2 1650       | 4000  | 125         | 4.42      | WM                   | W                      | Cabriolet.            | 2                    | 2 3345       | 4840    | 134½        | 4.5           | AM                   | T                      |                       |        |      |     |      |   |   |
| V-12                 |              |        |             |           |                      |                        | Conv't Vic.           | 5                 | 4 3935       | 4317   | 136½        | 4.69                 | WM                   | T                      | Elite Sedan.          | 5                 | 4 1650       | 4100  | 125         | 4.42      | WM                   | W                      | Longchamps.           | 4                    | 4 2435       | 4318    | 134½        | 4.5           | AM                   | T                      |                       |        |      |     |      |   |   |
| Spt. Phaeton.        | 4            | 4 4300 | 145         | 4.58      | WO                   | T                      | Conv't Vic.           | 5                 | 4 4095       | 4983   | 142½        | 4.69                 | WM                   | T                      | SV-16                 |                   |              |       |             |           |                      | Versailles.            | 5                     | 4 4345               | 4318         | 134½    | 4.5         | AM            | T                    |                        |                       |        |      |     |      |   |   |
| Spt. Touring         | 7            | 4 4300 | 145         | 4.58      | WO                   | T                      | Sedan.                | 5                 | 4 4150       | 5195   | 147½        | 4.69                 | DM                   | T                      | Club Sedan.           | 5                 | 4 3295       | 4920  | 134½        | 4.75      | AM                   | T                      | Club Sedan.           | 5                    | 4 3295       | 4920    | 134½        | 4.75          | AM                   | T                      |                       |        |      |     |      |   |   |
| Spt. Phaeton.        | 4            | 4 4500 | 5380        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Speedster.            | 7                 | 4 3895       | 4950  | 145         | 4.75      | AM                   | T                      | Speedster.            | 7                    | 4 3895       | 5045    | 145         | 4.75          | AM                   | T                      |                       |        |      |     |      |   |   |
| Coupe.               | 5            | 2 4400 | 3670        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Sedan.                | 5                 | 4 3995       | 5045  | 145         | 4.75      | AM                   | T                      | Sedan.                | 5                    | 4 3995       | 5045    | 145         | 4.75          | AM                   | T                      |                       |        |      |     |      |   |   |
| Town Sedan           | 4            | 4 4500 | 5530        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Touring               | 7                 | 4 2070       | 4380  | 131         | 3.77      | AM                   | W                      | Touring               | 7                    | 4 2070       | 4400    | 131         | 4.07          | WM                   | T                      |                       |        |      |     |      |   |   |
| Town Sed. 3W         | 4            | 4 4500 | 5530        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Sedan.                | 5                 | 4 2070       | 4400  | 131         | 4.07      | WM                   | W                      | Sedan.                | 5                    | 4 2070       | 4400    | 131         | 4.07          | WM                   | T                      |                       |        |      |     |      |   |   |
| Sedan.               | 5            | 4 4600 | 5870        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Conv't Sedan.         | 5                 | 4 2070       | 4400  | 131         | 4.07      | WM                   | W                      | Conv't Sedan.         | 5                    | 4 2070       | 4400    | 131         | 4.07          | WM                   | T                      |                       |        |      |     |      |   |   |
| Limousine.           | 7            | 4 4700 | 5925        | 145       | 4.58                 | WO                     | T                     | Master 8          |              |        |             |                      |                      |                        | Conv't Coupe.         | 2-4               | 2 1985       | 4510  | 131         | 3.77      | AM                   | W                      | Conv't Coupe.         | 2-4                  | 2 1985       | 4510    | 131         | 4.07          | AM                   | T                      |                       |        |      |     |      |   |   |
| MARMON               |              |        |             |           |                      |                        | Master 8              |                   |              |        |             |                      |                      | Custom 8               | 5                     | 4 2985            | 4450         | 138   | 4.45        | AE        | W                    | Custom 8               | 5                     | 4 2985               | 4450         | 138     | 4.45        | AE            | T                    |                        |                       |        |      |     |      |   |   |
| 8-125                |              |        |             |           |                      |                        | Custom 8              |                   |              |        |             |                      |                      | Custom 8               | 5                     | 4 3035            | 4495         | 138   | 4.45        | AE        | W                    | Custom 8               | 5                     | 4 3035               | 4495         | 138     | 4.45        | AE            | T                    |                        |                       |        |      |     |      |   |   |
| Coupe.               | 2-4          | 2      | 125         | 4.08      | W                    | T                      | Club Sedan.           | 5                 | 4 2320       | 4097   | 125         | 4.45                 | AE                   | W                      | Club Sedan.           | 5                 | 4 2320       | 4293  | 125         | 4.45      | AE                   | W                      | Club Sedan.           | 5                    | 4 2320       | 4293    | 125         | 4.45          | AE                   | T                      |                       |        |      |     |      |   |   |
| Conv. Coupe.         | 2-4          | 2      | 125         | 4.08      | W                    | T                      | Sedan.                | 5                 | 4 2485       | 5240   | 147½        | 4.69                 | DM                   | T                      | Sedan.                | 5                 | 4 2485       | 5240  | 147½        | 4.69      | DM                   | T                      | Sedan.                | 5                    | 4 2485       | 5100    | 135         | 4.42          | WM                   | T                      |                       |        |      |     |      |   |   |
| DeLuxe               |              |        |             |           |                      |                        | Sedan.                | 5                 | 4 2485       | 5240   | 147½        | 4.69                 | DM                   | T                      | 8-35                  |                   |              |       |             |           |                      | 8-35                   |                       |                      |              |         |             |               | T                    |                        |                       |        |      |     |      |   |   |
| Coupe.               | 2-4          | 2      | 125         | 4.08      | W                    | T                      | Master 8              |                   |              |        |             |                      |                      | Coupe.                 | 2-4                   | 2 2445            | 4500         | 135   | 3.77        | WM        | T                    | Coupe.                 | 2-4                   | 2 2445               | 4500         | 135     | 4.07        | WM            | T                    |                        |                       |        |      |     |      |   |   |
| Conv. Coupe.         | 2-4          | 2      | 125         | 4.08      | W                    | T                      | Master 8              |                   |              |        |             |                      |                      | Master 8               |                       |                   |              |       |             |           | Master 8             |                        |                       |                      |              |         |             | T             |                      |                        |                       |        |      |     |      |   |   |
| Sedan.               | 5            | 4      | 125         | 4.08      | W                    | T                      | Master 8              |                   |              |        |             |                      |                      | Master 8               |                       |                   |              |       |             |           | Master 8             |                        |                       |                      |              |         |             | T             |                      |                        |                       |        |      |     |      |   |   |
| PIERCE-ARROW         |              |        |             |           |                      |                        | Master 8              |                   |              |        |             |                      |                      | Master 8               |                       |                   |              |       |             |           | Master 8             |                        |                       |                      |              |         |             | T             |                      |                        |                       |        |      |     |      |   |   |
| 54                   |              |        |             |           |                      |                        | Master 8              |                   |              |        |             |                      |                      | Master 8               |                       |                   |              |       |             |           | Master 8             |                        |                       |                      |              |         |             | T             |                      |                        |                       |        |      |     |      |   |   |
| Coupe.               | 2-4          | 2      | 125         | 4.08      | W                    | T                      | Coupe Rdstr.          | 2-4               | 2 2650       | 137    | 4.08        | AK                   | T                    | Coupe.                 | 2                     | 2 2750            | 137          | 4.08  | AK          | T         | Coupe.               | 2                      | 2 2750                | 137                  | 4.08         | AK      | T           | Coupe.        | 2                    | 2 2750                 | 137                   | 4.08   | AK   | T   | T    |   |   |
| Coupe.               | 5            | 4      | 125         | 4.08      | W                    | T                      | Tourer.               | 5                 | 4 2750       | 137    | 4.08        | AK                   | T                    | Tourer.                | 5                     | 4 2750            | 137          | 4.08  | AK          | T         | Tourer.              | 5                      | 4 2750                | 137                  | 4.08         | AK      | T           | Tourer.       | 5                    | 4 2750                 | 137                   | 4.08   | AK   | T   | T    |   |   |
| C. C. Sedan.         | 5            | 4      | 150         | 4.78      | WD                   | T                      | Spt. Phaeton.         | 5                 | 4 3050       | 137    | 4.08        | AK                   | T                    | Spt. Phaeton.          | 5                     | 4 3050            | 137          | 4.08  | AK          | T         | Spt. Phaeton.        | 5                      | 4 3050                | 137                  | 4.08         | AK      | T           | Spt. Phaeton. | 5                    | 4 3050                 | 137                   | 4.08   | AK   | T   | T    |   |   |
| Conv. Coupe.         | 2-4          | 2      | 150         | 4.78      | WD                   | T                      | Club Bro'm.           | 5                 | 4 2385       | 137    | 4.42        | AK                   | T                    | Club Bro'm.            | 5                     | 4 2385            | 137          | 4.42  | AK          | T         | Club Bro'm.          | 5                      | 4 2385                | 137                  | 4.42         | AK      | T           | Club Bro'm.   | 5                    | 4 2385                 | 137                   | 4.42   | AK   | T   | T    |   |   |
| Conv. Sedan.         | 2-4          | 2      | 150         | 4.78      | WD                   | T                      | Sedan.                | 5                 | 4 2485       | 137    | 4.42        | AK                   | T                    | Sedan.                 | 5                     | 4 2485            | 137          | 4.42  | AK          | T         | Sedan.               | 5                      | 4 2485                | 137                  | 4.42         | AK      | T           | Sedan.        | 5                    | 4 2485                 | 137                   | 4.42   | AK   | T   | T    |   |   |
| Sedan.               | 5            | 4      | 150         | 4.78      | WD                   | T                      | Touring               | 7                 | 4 2485       | 137    | 4.42        | AK                   | T                    | Touring                | 7                     | 4 2485            | 137          | 4.42  | AK          | T         | Touring              | 7                      | 4 2485                | 137                  | 4.42         | AK      | T           | Touring       | 7                    | 4 2485                 | 137                   | 4.42   | AK   | T   | T    |   |   |
| 970                  |              |        |             |           |                      |                        | Sedan.                | 5                 | 4 2485       | 137    | 4.42        | AK                   | T                    | Sedan.                 | 5                     | 4 2485            | 137          | 4.42  | AK          | T         | Sedan.               | 5                      | 4 2485                | 137                  | 4.42         | AK      | T           | Sedan.        | 5                    | 4 2485                 | 137                   | 4.42   | AK   | T   | T    |   |   |
| Coupe.               | 2            | 2      | 945         | 2870      | 116½                 | 4.73                   | AM                    | Enc. Dr. Lim.     | 7            | 4 2950 | 142         | 4.42                 | AK                   | T                      | Regal Coupe.          | 2                 | 2 2445       | 4500  | 135         | 4.27      | W                    | T                      | Regal Coupe.          | 2                    | 2 2445       | 4500    | 135         | 4.27          | W                    | Regal Coupe.           | 2                     | 2 2445 | 4500 | 135 | 4.27 | W | T |
| Spec. Sedan.         | 5            | 4      | 955         | 3000      | 116½                 | 4.73                   | AM                    | Enc. Dr. Lim.     |              |        |             |                      |                      |                        |                       |                   |              |       |             |           |                      |                        |                       |                      |              |         |             |               |                      |                        |                       |        |      |     |      |   |   |



Packard Twin-Six powerplants are notable for their clean design. All accessories with the exception of the starter motor are at the front end. Tommy Milton and A. J. Van Ranst cooperated with Packard engineers in the design of this engine

## Packard Plays for High-Low Markets And Light Eight, the Latter Selling



Detail of front end showing the rectangular axle end, with drag link and springs underslung and tie-rod passing over the springs. The car is 2 in. lower without sacrifice in road clearance, it is claimed

PACKARD MOTOR CAR CO. comes to the New York Automobile Show with two completely new cars, a light eight, with which this company enters the under-two-thousand-dollar field for the first time, and a twin-six or V-type twelve-cylinder car at the other end of the price range. At the same time it is expected that prices on the Packard Standard Eight and De Luxe Eight will be reduced somewhat.

While officially called the "light eight," this new car is by no means small. It has a wheelbase of 128 in. and a powerplant almost identical with that used in the Packard Standard Eight, developing, it is claimed, 110 hp. In performance, therefore, due to a

five to seven hundred pound lower weight, it should outdo the standard eight.

In appearance the car follows modern lines throughout, with sloping, visorless windshields, a sharply pointed radiator shell, and on the two-door, close-coupled sedan a streamlined sloping rear panel. Rear ends are decidedly clean in appearance, with the gas tank cover formed by the lower end of the rear body panel. At the front end fenders extend down over integral hood sills to form each one-half of the radiator splash guard, while also enclosing the front frame horns.

The false radiator front with vertical vanes curves forward at the bottom, streamlining it into the splasher. Headlamp lenses are also V-shaped. An unusual feature is that front and rear bumpers as well as shatterproof glass throughout are included in the standard equipment at the factory list price, which is reported to be somewhere in the neighborhood of \$1,700 to \$1,800 for the lowest-priced model.

In fact, the only "essential" item of equipment not included is a spare tire. The four regular tires are six-ply, 6.50-in. on 17-in. disk wheels.

Just what horsepower the twin-six develops the writer does not know. The engine is rated by Packard at 150 hp. at 3600 r.p.m., but the peak is not reached at this speed, and Packard engineers claim that the engine is designed to operate if desired at 4500 r.p.m. The angle between the blocks, which are cast integral with the crankcase, is 67 deg. The reason for the selection of this angle is due to three factors:

1. Desire to make the powerplant as compact as possible, while
2. leaving adequate room for the horizontal valve mechanism within the engine Vee.
3. Eliminating the synchronous periods which occur

**The Packard line  
now includes:  
Twin-Six  
De Luxe Eight  
Standard Eight  
Light Eight**

**With Twin-Six  
Below \$2,000**

frequently in multi-cylinder engine designed for equal firing intervals.

In the design of this powerplant, Packard engineers had the assistance of (among others) Tommy Milton, noted race driver and racing car designer, and A. J. Van Ranst, formerly chief engineer of the Cord Division of the Auburn Automobile Company.

Taking the new light eight unit by unit, much that is new to the Packard Motor Car Co.'s products is to

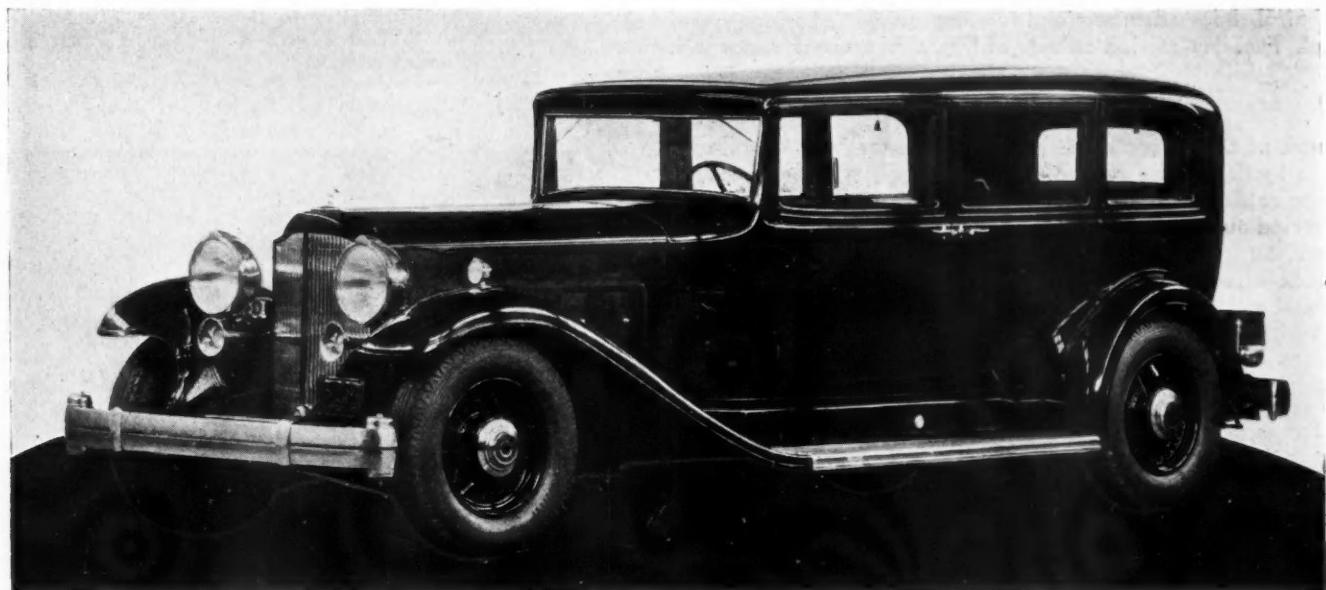
be found. Engines, as has been mentioned, are the same as those used on the standard eight, with minor exceptions and improvements, many of which have also been incorporated on that car. Clutches are also interchangeable, while the new transmission is to be found on all four Packards.

This transmission is of the synchromesh type with constant-mesh helical gears for all three forward speeds. Anti-friction bearings are used throughout, except on the reverse idler. The countershaft has a ball bearing at the front and roller bearings at the rear.

Universals are the same as on the standard eight. Rear axles, however, are of new design, with the axle housing tilted forward at the top almost 45 deg., giving 1 in. additional clearance both above and below. Smaller, 17-in. wheels bring the frame lower without sacrifice in road clearance, while bodies could also be lowered an additional inch with the same clearance as on the standard eight.

Front axles are also new, with rectangular ends and curved reinforced I-beam center section. Springs and drag link are underslung at the front end, with the tie-rod passing over the metal-covered springs. The latter are shackled at the front end, and all spring shackles are of the rubber type, consisting of two bushing halves with enlarged conical ends. Before assembly, spring-eye pins are copper-plated and the inside of the rubber is chemically treated so that a self-vulcanizing action between the two takes place. Central lubrication is not used on this car.

Frames—as may be noted from the illustration—are of completely new design. The rear legs of the X-member extend to the frame side-rail at the rear-spring front hanger. Forward legs form a box section where they meet the frame to carry the rear engine supports. The engine, incidentally, is mounted at four



Packard's new Twin-Six, which is being introduced to the public at the New York Automobile Show. It fits into the upper price range bracket

points in rubber, of the tension type, with large, vertically located blocks of rubber bonded to two metal plates.

At the front end of the frame there is an interesting K-member, tying the front end of the frame horns into the center of the large radiator cross-member. At the extreme rear two cross-members are tied together with U section members over the gas tank, relieving the rear cross-member of much of the tire-carrier load.

Side rails, it will be noted, are quite straight, with the maximum 8-in. side rail depth carried forward of the front-spring rear-hanger bracket. Reinforcing plates are riveted into the side rails at the top of the rear kick-up, and rubber bumper pads are attached to the lower flange of the side rail at this point for protection against the axle striking through.

Shock absorbers are of the Packard-Delco-Products ride control type, adjustable from the front compart-

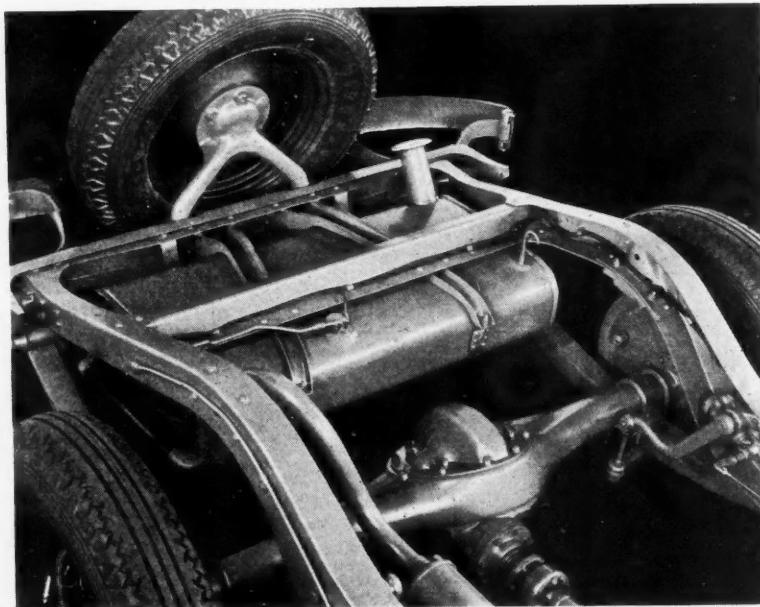
on brackets outside the frame side channel. They are somewhat lighter than those on the standard eight, but appear to be well braced. They are insulated against outside temperature and noise in the same manner as the more expensive Packard Eights.

Particularly noticeable about the bodies are the new lines. In addition to the details already mentioned, there are such items as running boards curved upward at the front to streamline them into the front fenders. A concealed headlamp tie bar behind the false radiator front, concealed hood latches, absence of a starter crank opening or cover in the radiator front, and well rounded rear-quarter panels.

In equipment the cars are well supplied. Instruments include an engine thermometer and dash gasoline gage, while the instrument board also carries a cigar lighter, two glove or package compartments, and a new type of starter control. This is of a simple push button type, which energizes a solenoid switch mounted on the starter motor. Only a light finger pressure is required to operate it.

Further in the equipment there are two automatic windshield wipers, three cowl ventilators, one at the top and two at the side, all screened, a cigar lighter and two ash receptacles in the rear compartments, and the formerly mentioned shatterproof glass all around, including rear windows, six-ply tires and front and rear bumpers. Wheels have concealed hub-bolts. Instruments are of the large face type. There are two folding interior visors. There are also two combination tail and stop lights, one on each rear fender. Front seats and steering columns are adjustable. Engines are fitted with combination intake silencer and air cleaner, oil filter, water circulation controlling thermostat, thermostatic intake manifold heat control, and 6.0 to 1 compression-ratio heads.

Batteries have a rated capacity of 152 amp. hr. Shock-absorber control links are fitted with oilless bushings. Radiators have a capacity of 4 3/4 gallons, and the standard axle ratio is 4 1/3 to 1, with 4.0 to 1 and 4 2/3 to 1 optional at extra cost.

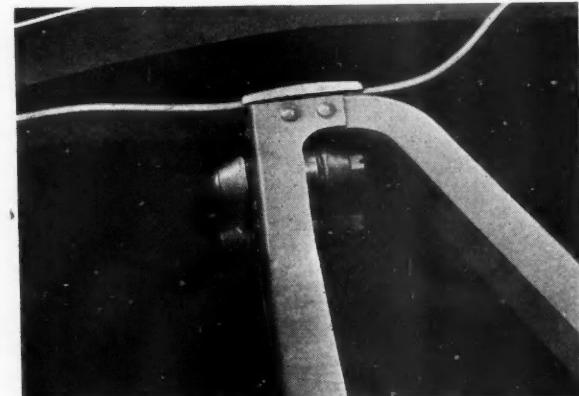


Detail of rear end of Packard Light Eight chassis showing the tilted hypoid axle and the rear frame bracing. Note ride-control shock absorbers and fuel line outside of frame channel. Fuel line carried outside of frame to prevent vapor lock

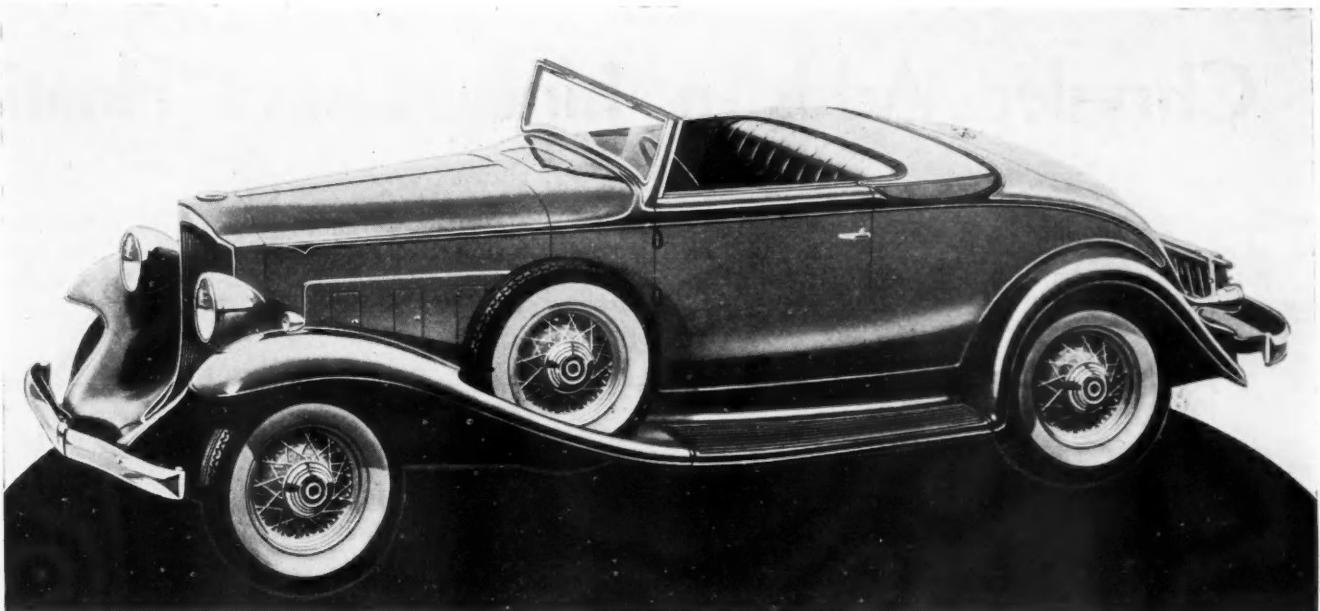
ment at the driver's option. Gas tanks have a capacity of 20 gal. and are vented at the front with a gooseneck pipe rather than through the filler cap. Fuel lines are carried outside the frame as a protection against vapor lock, and the fuel pump is located at the front of the block directly in the fan blast for cooling. An additional protection against vapor lock is the provision of an air scoop in the hood instead of one of the louver doors for directing cooling outside air onto the carburetor.

Mufflers are of the straight-through type. Brakes are similar to those on the standard eight, of the Bendix two-shoe type, cable-controlled. The emergency lever is located at the left of the driver, with the cross shaft passing through the side rail and one leg of the X-member, thus giving a rigid support against deflection. Gearshift levers are located forward of the aluminum case on the clutch housing, for front compartment clearance.

Bodies, as is customary with Packard, are mounted



Detail of front end of frame showing part of the K-member bracing of the spring horns and the rubber shackles used on the light eight



Convertible coupe on the Packard Light Eight chassis. Note how the fenders are swept down in front to form the integral fender sill and front splash guard

Four body types are being offered on the light eight, a five-passenger, four-door sedan; a five-passenger, two-door, close-coupled sedan; a coupe with or without rumble seat, and a rumble seat convertible coupe.

### Packard Twin-Six

While complete details of the new Packard Twin-Six engine are not available at the time this is written, a general idea of the powerplant can be given. Bore and stroke are  $3\frac{3}{8}$  and  $3\frac{1}{2}$  in. respectively for a piston displacement of 375 cu. in. The short stroke not only permits high-speed operation with low piston speed, but also enables the use of an unusually rigid crankshaft.

The latter has  $2\frac{1}{2}$ -in. crankpins, for the side-by-side connecting rods, and four  $2\frac{3}{4}$ -in. main bearings. These dimensions result in an overlap of  $\frac{7}{8}$ -in. The shaft, moreover, has fairly heavy crankcheeks and is machined all over, with counterweights bolted on. Main bearings are of the steel-backed, babbitt-lined type. A damper is fitted at the front end of the shaft outside of the crankcase.

Connecting rods are of I-section and rifle-drilled for pressure lubrication to the wrist-pin bearings. Pistons are of a new design, of aluminum alloy, with invar strut, and carry four rings. It will be noted that the cylinder heads are bolted on at right angles to the block, with spark plugs set vertically into the head, or at an angle to the combustion chamber. Valves, of course, are also at an angle, since they are horizontally mounted in the Vee between the blocks. They are operated through individual rockers, provided with a hydraulic mechanism for automatic tappet adjustment.

There is a single camshaft, located over the crankshaft in the crankcase and driven by a short two-point chain. This shaft is also carried in four bearings, with inlet valve cams adjacent to the bearings. Cam-follower rollers and rocker arms are both mounted on needle-type roller bearings, consisting of accurately finished small-diameter solid rollers assembled without a special race. Owing to the automatic adjustment

feature the valve mechanism is unusually silent. Nickel steel intake and silicon chrome steel exhaust valves are both quite large, with a clear diameter of  $1\frac{1}{2}$  in.

The fuel system consists of a Stromberg duplex downdraft carburetor combined with an interesting downdraft intake manifold. Directly below the carburetor venturis are two conical "stoves" extending down into the exhaust manifold passages below the intake manifold. The manifold itself has three passages to each of the two blocks, each feeding two cylinders. The central passages are provided with baffles extending from top to bottom of the passage, with space for the inlet gases at either side. This baffle performs the function of preventing an over-rich mixture from reaching the center cylinders of each block. What it does is to trap the fuel which normally surges back and forth in a three-port manifold, which is the cause of this over-richness in six-cylinder blocks.

The trapped or surging liquid, as well as unvaporized fuel from the carburetor itself, drops down into the aforementioned stoves, where it is vaporized by exhaust heat. At the tip at the bottom of the cone there is located an atomizing jet with connection to the outside atmosphere. When the throttle is closed, air is sucked in through this jet at high velocity, causing atomization of the fuel lying in the bottom of the cone, for easy starting.

It must be understood that the intake air itself does not pass through these stoves, but over the top of the open end. The aforementioned atomizing jet is provided with a drain opening at the top, so that excess fuel in the intake stove will drain out below the engine pan. In this manner a virtually constant fuel level or reservoir is maintained in the bottom of the cone. The arrangement provides all advantages of an intake liquid fuel heater, without heating the intake air itself, which would result in reduced volumetric efficiency. In fact, a 1-in. thickness of asbestos is inserted between the intake and exhaust manifolds where they bolt together, to reduce the flow of heat from the latter to the former.

A combined intake silencer and air cleaner is pro-  
(Turn to page 66, please)

# Chrysler Adds a Line, Uses "Floating"

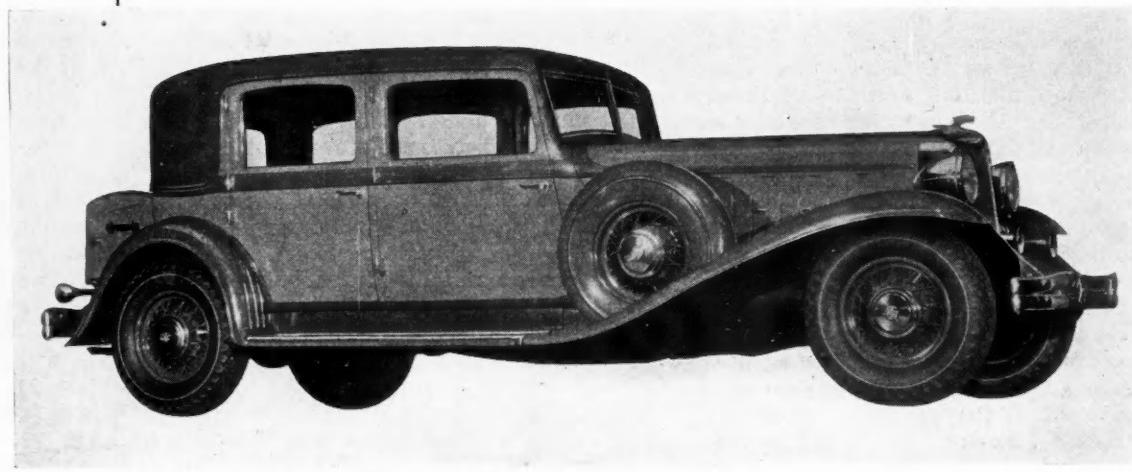
FOR 1932 the Chrysler Sales Corp. offers four lines of cars: the Six, the Chrysler Eight, the Imperial Eight and the Imperial Custom Eight, the last mentioned being an addition to the line. Mechanical

refinements found on all four lines include "floating power" mountings, automatic clutches combined with free wheeling, centrifuse brake drums, X-member frames and oilite "squeak-proof" springs.

## Changes in Chrysler Specifications

| CHRYSLER EIGHT   |                                   |
|--|-----------------------------------|
| New Model  | Former Model                      |
| Parking brake diam. 7½ in.   | 7 in.                             |
| Service brakes, diam. 13 in.   | 12 in.                            |
| Wheelbase ..... 125 in.  | 122 in.                           |
| Clutch facing, inside diam. ..... 6½ in.                                     | 6½ in.                            |
| outside diam. ..... 9¾ in.   | 9¾ in.                            |
| Radiator core thickness ..... 4 in.  | 3½ in.                            |
| Engine, stroke ..... 4½ in.  | 4¼ in.                            |
| displacement ..... 298.65  | 282.1                             |
| max. horsepower. 100-3400  | 100-3400                          |
| Engine mounting ... floating power   | 5-point rubber                    |
| Carburetor make ... Stromberg  | DXR-3                             |
| nominal size ..... 1½ in.  | Stromberg                         |
| Conn. rod length ..... 9 in.   | 1¾ in.                            |
| lower bearing type removable lower bearing length ..... 1½ in.               | 8½ in.                            |
| Crankshaft weight ..... 92 lb.   | 89¾ lb.                           |
| Valve length ..... 5½ in.  | 5¼ in.                            |
| Distributor, No. of breakers ..... one                                       | two                               |
| Frame type ..... X-member flange width ..... 2½ in.                          | conventional 21/16 in.            |
| Fuel pump type ..... integral with wiper vacuum booster pump make ..... A.C. | mechanical fuel pump A.C.         |
| Gas tank capacity ..... 19½ gal.   | 15½ gal.                          |
| Oil press, relief valve opens ..... 50 lb.                                   | 45 lb.                            |
| Muffler ..... 2-tandem   | one                               |
| Springs, front, length 38¾ in. anti-squeak ..... oilite inserts              | 38 in. none                       |
| Spring covers ..... standard   | .....                             |
| Steering gear type Worm and roller ratio ..... 17 to 1                       | worm and sector 16½ to 1          |
| Front axle caster ..... 1¼ deg.  | 1 deg.                            |
| camber ..... 1 deg.  | 2 deg.                            |
| Toe in ..... 3/32  | ½ in.                             |
| Transmission bearings, countershaft, roller                                  | bronze bushing side ring 3.12 in. |
| Rim type ..... Drop center   |                                   |
| Rim width ..... 3.62 in.   |                                   |

| CHRYSLER IMPERIAL AND IMPERIAL CUSTOM EIGHT                          |                       |
|--|-----------------------|
| New Model  | Former Model          |
| Brake lining width. 2 in.  | 1¾ in.                |
| Tread, front ..... 59¾ in.   | 58½ in.               |
| rear ..... 61 5/32 in.   | 60 in.                |
| Wheelbase ..... 135 and 146 in.                                      | .....                 |
| Clutch facings, O.D. 11½ in. inside diam. ..... 6½ in.               | 11 in. 6½ in.         |
| Radiator core thickness ..... 4½ in.                                 | 4 in.                 |
| Capacity of system ..... 6½ gal.                                     | .....                 |
| Compression ratio std. ..... 5.2 to 1                                | 5.0 to 1              |
| Engine mounting ... floating power                                   | 5-point rubber        |
| Carburetor make ... Stromberg  | Stromberg             |
| DD-2   | DD-3                  |
| Piston pin length ... 3 in.  | 2½ in.                |
| Distributor type, Imperial 8   | semi-auto.            |
| Custom Imperial automatic  | .....                 |
| No. of breakers ..... one  | two                   |
| Frame type ..... X-member flange width (Imperial 8) ..... 2 1/16 in. | conventional 2/4 in.  |
| Gas tank capacity (Imperial 8) ..... 19½ gal.                        | 21½ gal.              |
| (Imperial custom 8) ..... 21½ gal.                                   | 21½ gal.              |
| Oil pump driven gear ..... bronze driving gear ..... steel           | steel bronze          |
| Springs, front length 39½ in.  | 39¾ in.               |
| Steering-gear type worm and roller ratio ..... 20 to 1               | cam and lever 18 to 1 |
| Steer. wheel diam. 18½ in.   | 17 25/32 in.          |
| Front axle caster ..... 1¼ in.                                       | 1 in.                 |
| camber ..... 1 deg.  | 2 deg.                |
| Tire size ..... 7.50/17  | 7.50/17-7.00/18       |
| Transmission ratios, low ..... 3.63                                  | 3.38                  |
| second ..... 2.48  | 2.35 to 1             |
| third ..... 1.38 to 1  | 1.41 to 1             |
| reverse ..... 3.14 to 1  | 2.91 to 1             |
| Rim diam. ..... 17 in.   | 17 and 18 in.         |
| rim width ..... 4.19 in.   | 5 in.                 |



Chrysler Custom Imperial Eight close-couple sedan

# "Power" Principle on All Its Cars

**Automatic clutches with free wheeling, centrifuse  
brake drums, X-member frames and squeak-proof  
springs included on four 1932 chassis models**

The strokes of the Chrysler six and eight engines have been increased, chiefly for increased torque at low speeds, and the peak horsepower of the six is now 82 instead of 80. Wheelbases also have been increased to 116 in. for the six and 125 in. for the eight. The Imperial Eight has a wheelbase of 135 in. and the Imperial Custom Eight of 146 in. There are six body types on the six, five on the eight, three on the Imperial Eight and six on the Imperial Custom Eight.

Among the chassis improvements, the one on which particular stress is laid is the "floating" mounting of the powerplant. This is similar in principle to that introduced on the Plymouth last summer but differs from it in detail. It embodies the torque spring extending from the powerplant to the frame side rail.

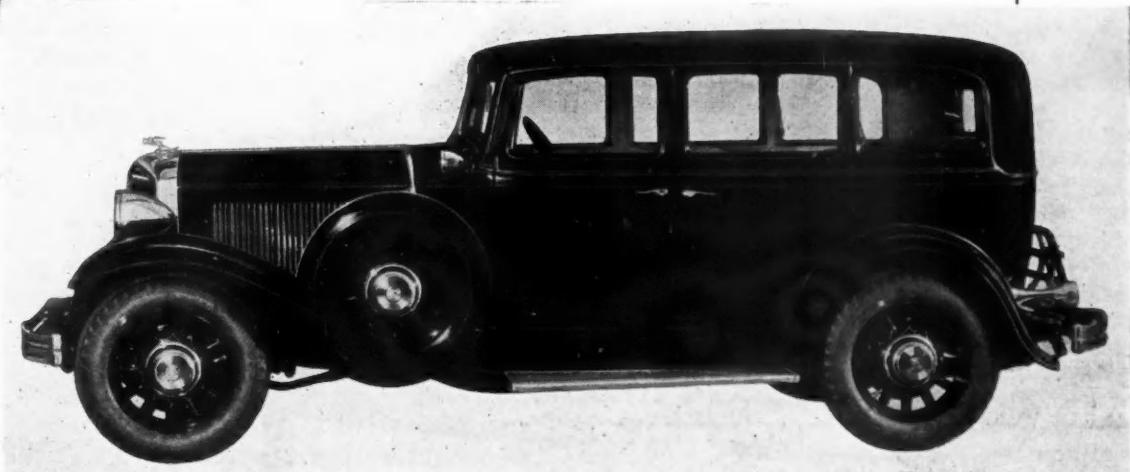
The automatic clutch is interconnected with the free-wheeling unit so that whenever the latter unit is in the "coasting" position the clutch is also disengaged. No separate lockout is provided for the friction clutch, the lockout for the free-wheeling unit serving for both. The rate of engagement of the clutch depends on the position of the throttle; a plunger valve interconnected with the main operating plunger valve determines the time required for the escape of the trapped air during the return or engagement stroke of the piston. The valve unit is located in the inlet manifold.

Since the removal of the foot from the accelerator pedal disconnects the transmission from both the engine and the rear axle, gear shifting is exceptionally

(Turn to page 65, please)

## Chrysler Six Specifications That Are New

| New Model   | Former Model | New Model                                    | Former Model   |
|---|--------------|--|----------------|
| Rear axle ratio<br>(all except sedan) 4.30 to 1       | 4.60 to 1    | Engine stroke .....                          | 4½ in.         |
| Rear axle lubricant 3/4 pt.                           | 4 1/5 pt.    | Displacement .....                           | 217.8 cu. in.  |
| Brake drum diam. ... 12 in.<br>make ..... Motor Wheel | 11 in.       | Engine mounting<br>type ..... floating power | 4-point rubber |
| Lining width ... 1¾ in.                               | 1½ in.       | Carburetor make ... Ball and Ball            | Schebler       |
| Wheelbase ..... 116 in.                               | .....        | Conn. rod length ... 8¾ in.                  | 8 13/16 in.    |
| Tread, front ..... 57 3/16 in.                        | 57 5/16 in.  | Spark plugs, type ... 14 mm.                 | 18 mm.         |
| rear ..... 58 7/8 in.                                 | 57 in.       | Oil press. relief *<br>opens at ..... 50 lb. | 40 lb.         |
| Clutch cushioning spring                              | None         | Kick shackle ..... yes                       | no             |
| Fan blade setting ... 60 & 120 deg.                   | 90 deg.      | Front axle caster ... 1¼ deg.                | 1½ deg.        |
| Radiator core thickness ..... 2¾ in.                  | 3½ in.       | Wheels, size ..... 18 in.                    | 19 in.         |
|   |              | Tire section ..... 5.50 in.                  | 5.25 in.       |
|   |              | Rim width ..... 3.25 in.                     | 3 in.          |



Chrysler Six five-passenger sedan

# Transmission Improvements Mark Dodge

**A**UTOMATIC clutches, "floating power" engine mounting, double-drop X-member frames for lower center of gravity, longer wheelbase, Oilite "squeakproof" springs, and centrifuse brake drums are among the mechanical changes and innovations to be found on the 1932 lines of Dodge Brothers cars.

Bodies on both six and eight also follow the modern trend toward decreased wind resistance, with sloping, visorless windshields, and increased curvature of body panels.

Transmission innovations are probably of major interest. Free wheeling is continued on both lines, with the unit at the rear of the transmission. The vacuum-operated clutch is so installed that its action is completely automatic unless the free-wheeling unit is locked out, the clutch disengaging whenever the accelerator pedal is released.

It will be apparent that under these conditions the transmission is completely disconnected both at the front and rear, enabling shifting into any gear as if the car were standing still. The automatic clutch, of course, is effective also when the car is standing still with the engine running. The gear-shift lever, therefore, is nothing more than a gear selector, which might as well have been located on the steering wheel, or some similar place, except for the necessity of providing for the condition of driving without free wheeling. Locking out the free-wheeling unit through a button on the dash also renders the automatic clutch action ineffective.

The accompanying diagram shows how the clutch operates. It will be noted that there are two con-

**Automatic clutch simplifies operation for novice drivers. "Floating power" and improved springing diminish noises. Engine is carried on sub-frame in new "X-member" design**

trol valves in the housing at the intake manifold, the lower of these two being interconnected with the free-wheeling lockout, while the upper is connected to the accelerator pedal. Owing to the use of free wheeling in addition to the automatic clutch, it is unnecessary to provide metering valves to control or vary the rate of clutch engagement according to gear ratio. However, the rate of engagement is varied according to throttle position. This is ac-

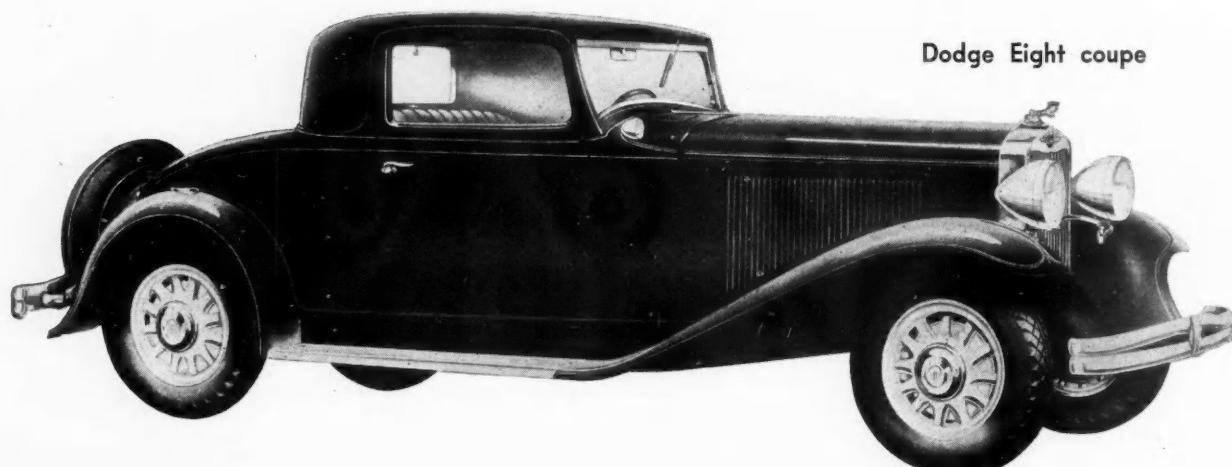
## Dodge Prices

### Six Cylinder

|                         |       |
|-------------------------|-------|
| Business Coupe .....    | \$795 |
| Rumble Seat Coupe ..... | 835   |
| Four-Door Sedan .....   | 845   |

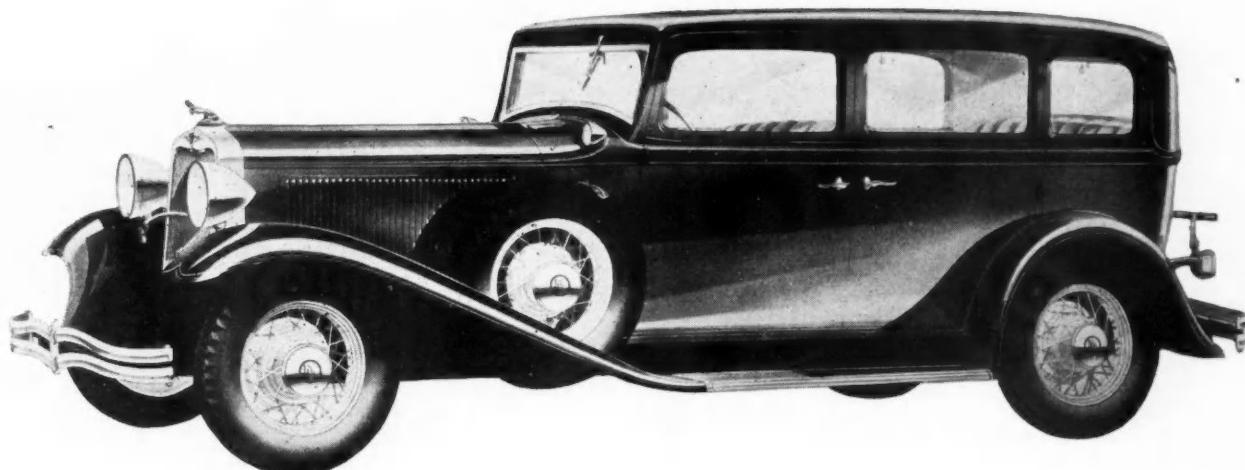
### Eight Cylinder

|                            |         |
|----------------------------|---------|
| Rumble Seat Coupe .....    | \$1,115 |
| Four-Door Sedan .....      | 1,145   |
| Five-Passenger Coupe ..... | 1,145   |

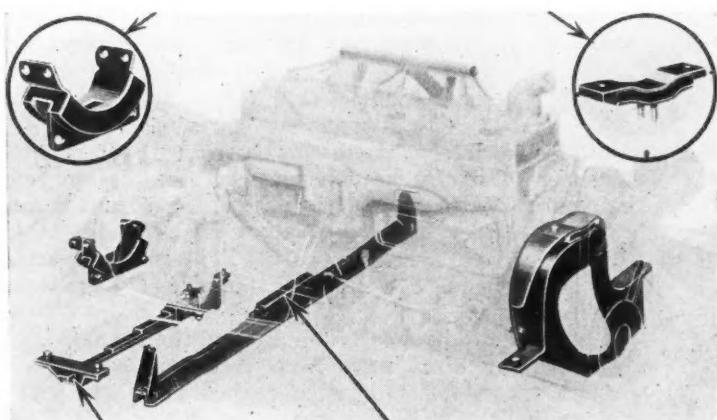


Dodge Eight coupe

# Six and Eight Lines



Four-door sedan on the six-cylinder Dodge Brothers chassis



Phantom view showing how the "floating power" mounting has been worked out in connection with the Dodge engines. It will be noted that the powerplant is really mounted in a sub-frame formed by the forward legs of the X-member

complished by leading the air bleed from the operating cylinder back to the main control valve. With the throttle wide open the clutch engages faster.

The floating-power type of mounting, while differing in detail design, is similar to that used on the Plymouths, and intended to produce the same result—that of isolating powerplant vibrations. In addition to the torque spring, however, there is also a rubber "torque damper" consisting of a soft rubber block on a special cross-member below the rear end of the crankcase just ahead of the clutch housing. The torque spring is located just ahead of the trans-

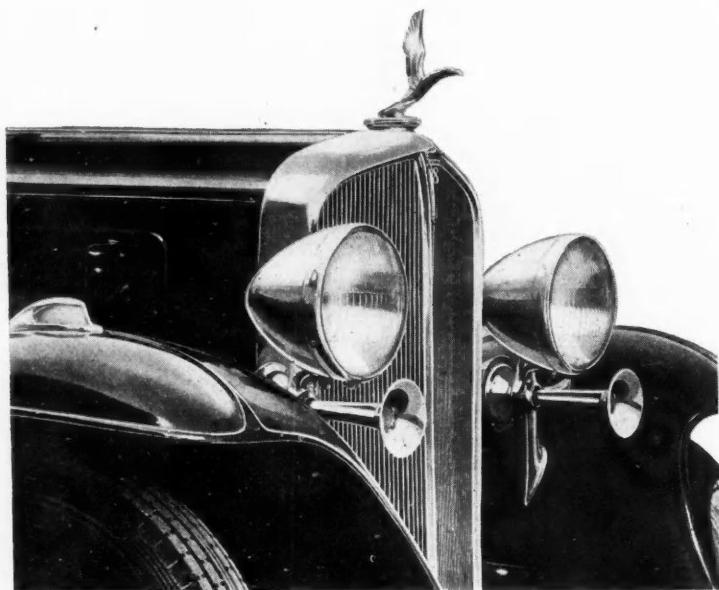
mission. Pedals, controls, etc., are mounted on the frame instead of on the power-plant, so that the increased movement of the latter will not affect the controls.

The new X-member frame worked out for the 1932 Dodges is one of the most interesting designs along this line we have yet seen. The frame siderails follow the body outline, as formerly, while powerplants are virtually carried in a sub-frame created by the forward legs of the X-member. It will be noted from the illustrations that these forward legs do not end at the siderails, but extend forward within them, forming a rigid box section at the front kick-up. Ahead of the kick-up the legs again curve inward from the siderails to form gusseting members for the front cross-member. There is an additional cross-member tying the lower flanges of the side rails together at the rear end of the engine, which member carries the "torque damper" previously mentioned. There is a cross-member also at the rear kick-up, and another one at the end of the frame, forming a gas tank cover. About midway between the center of the X and the point where the front legs reach the siderail, there are brackets riveted to the inside of the X-member legs, to which attaches another cross-member—that carrying the rear support for the powerplant.

The wheelbase of the Dodge eight is now 121½ in. Reduced body height and the longer hood tend to emphasize the increased overall length. Tires are of larger section on smaller wheels. New equipment includes two interior sun visors, silk roller curtains for rear quarter windows in sedans, fully adjustable front seats in the sedans, two cowl ventilators, rubber draft eliminators around controls, and increased body insulation. Both the convertible coupe and

(Turn to page 74, please)

# General Motors Drops Oakland



**Detail front view of the Pontiac Eight showing the new radiator emblem, etc.**

**T**WO lines of cars will bear the Pontiac name in 1932, the Oakland Motor Car Co. having decided to market its V-eight under the Pontiac rather than the Oakland name. Both lines of cars carry numerous improvements, outstanding of which are the adoption of new synchro-mesh helical gear transmissions, roller-type free-wheeling units effective in all forward speeds, ride-control shock absorbers, and more sloping, visorless windshields.

The wheelbase of the six has been increased 2 in., to 114 in., and a longer hood, with door ventilators, is now fitted. In the six engine the connecting rods are now rifle-drilled for pressure lubrication to the

**Synchro-mesh helical gear transmissions, roller-type free wheeling, ride-control shock absorbers and visorless windshields used on both models**

piston pins; the horsepower of the engine has been increased from 60 to 65, and twin horns are mounted below the headlamps. Spring covers, intake silencers combined with air cleaners, and Bendix two-shoe brakes are now standard equipment on both cars.

Taking the six first, the power increase is due to the combination of a more compact G.M.R.-type cylinder head, a higher compression ratio, and use of venturi-type intake ports for increased volumetric efficiency. Carburetor changes have also contributed their part. Valve timing has been changed, and there is now a 10 deg. overlap of the exhaust and intake periods. Spark plugs are of the 14-mm. type, and their location in the combustion chamber has been changed.

A number of changes center around the crankshaft. Main bearing sizes have been increased somewhat through the adoption of steel-backed bearings, with thinner shells. The net increase in bearing diameter is 3/32 in. The shaft has also been provided with integral counterweights to reduce bearing loads and

**The Pontiac Eight four-door sedan, while provided with additional refinements of design will probably be somewhat lower priced than the former Oakland Eight comparative model. Note the twin horns standard on all de luxe and sport models of both lines**



# Line; Two Pontiacs Carry On for 1932

## Specifications of Pontiac Six and Eight

|                       | Pontiac Six   | Pontiac Eight  | Pontiac Six              | Pontiac Eight   |
|-----------------------|---------------|----------------|--------------------------|-----------------|
| Wheelbase             | 114 in.       | n.c.           | 4-point                  | n.c.            |
| Shipp. weight, Sedan  | 2750 lb.      | n.c.           | rubber                   | n.c.            |
| Road clearance        |               |                | Intake silencer          | Yes             |
| front axle            | 8 5/16 in.    | n.c.           | Clutch facings area      | 43 sq. in.      |
| rear axle             | 8 1/8 in.     | n.c.           | outside diam.            | 9 5/8 in.       |
| Water capacity, full  | 14 qts.       | 25 qts.        | inside diam.             | 8 1/8 in.       |
| to inlet test cock    | 11 qts.       | 23 1/2 qts.    | thickness                | 6 1/4 in.       |
| Radiator type         | n.c.          | cross-flow     | Transmission features    | 5/32 in. (n.c.) |
| Fuel capacity         | 15 gal.       | 20 gal.        | synchro-mesh             | 5/32 in.*       |
| Exhaust manifold      | 6-port        | n.c.           | helical gears            | helical gears*  |
| Compression ratio     | 5.1 to 1      | 5.2 to 1       | and free wheel-          | and free wheel- |
| Compression press     | 114 lb.       | n.c.           | ing                      | ing             |
| Crankshaft counter-   |               |                | Transmission ratios, low | 2.90 to 1       |
| ' weighted            | Yes           | n.c.           | 2nd                      | 1.66 to 1       |
| Wristpin lubrication  | Press.        | n.c.           | reverse                  | 3.67 to 1       |
| Main bearings, type   | steel-backed  | n.c.           | Transmission make        | Muncie Prod.    |
| Diam., front          | 2 3/32 in.    | n.c.           | Free-wheeling make       | Detroit Gear    |
| center                | 2 5/32 in.    | n.c.           | Free-wheeling type       | roller          |
| rear                  | 2 7/32 in.    | n.c.           | Free-wheeling lockout    | dash button     |
| Length, front         | 1 5/8         | n.c.           | Brakes type              | Bendix two shoe |
| center                | 1 15/16       | n.c.           | drum diameter            | 12 in. (n.c.)   |
| rear                  | 2 in.         | n.c.           | width, lining            | 13 in. (n.c.)   |
| Connecting rods       | rifle-drilled | n.c.           | braking area             | 1 3/4 in.*      |
| upper bearing length  | 1 5/16 in.    | piston         | Shock absorbers          | Delco Products  |
| Piston pin locked in  | piston        | piston         | type                     | ride control    |
| Piston pin lock       | set-screw     | set-screw      | Spring covers std.       | yes             |
| Valves, intake, seat  |               | n.c.           | Wheels size              | 18 x 3.00 in.   |
| angle                 | 30 deg.       | n.c.           | tire section             | 5.25 in.        |
| Camshaft bearings     | 3             | n.c.           | Spark plugs type         | 14 mm.          |
| type                  | steel-backed  | n.c.           | Rear bumper type         | full length     |
| Flywheel, No. teeth   | 139           | 147            | Transmission bearings,   |                 |
| tooth pitch           | 10            | 10             | main drive gear          | ND-907507       |
| tooth width           | 3/4 in.       | 3/4 in. (n.c.) | mainshaft, front         | Hyatt-141814    |
| Water pump rear bush- | graphite      | graphite       | mainshaft, rear          | ND-907506       |
| ing                   | bronze        | bronze         | Rear axle ratio, std.    | n.c.            |
| Manifold heat control | automatic     | n.c.           | optional                 | n.c.            |
| Carburetor type       | 3-jet         | n.c.           | std. ring gear teeth     | n.c.            |

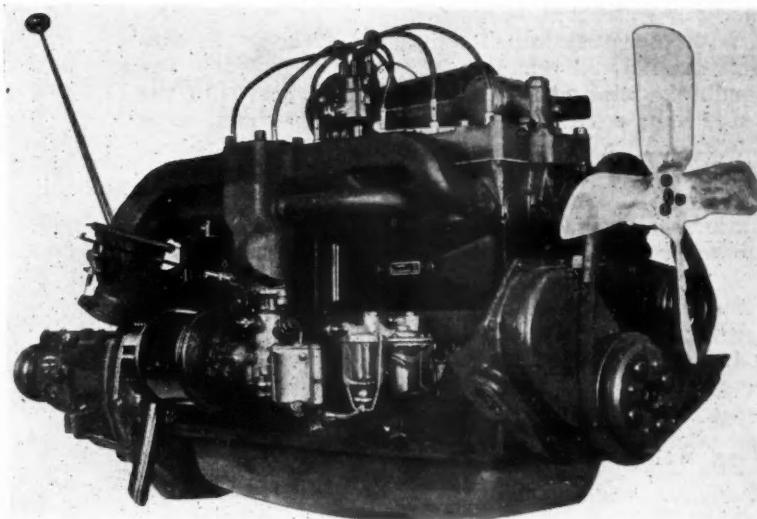
NOTE: n.c. = no change; \* = no change

Pontiac six-cylinder engine showing the new manifolding and combination intake silencer and air cleaner

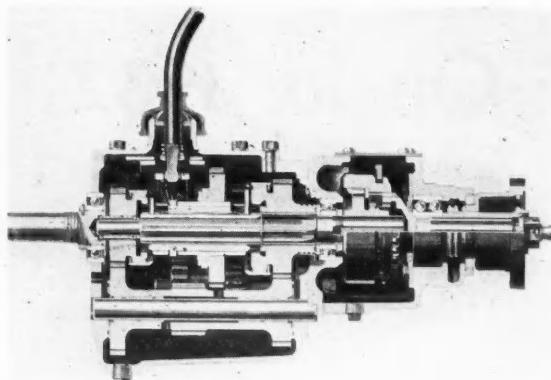
increase engine smoothness, and its weight is now 8 lb. more. Crankshaft balancers have been increased in size. A change in the main bearing anchor permits readier replacement of the bearings.

Camshaft bushings are of the thin-wall, steel-backed, babbitt-lined type. A water-distributing tube is placed in the block on the valve side, to reduce the temperature difference between the front and rear of the block. Exhaust ports are now individual instead of being siamesed. Connecting rods are now rifle-drilled for pressure lubrication to the piston pins. The design of the latter has been changed as shown in the accompanying specifications, allowing the pistons to expand and contract independently. A graphite-bronze bushing is now used at the rear of the water-pump shaft and is provided with an oil pocket holding sufficient oil to lubricate this bearing for a period of six months.

A combination air cleaner and intake silencer has been added to the carburetor, with the air intake



toward the rear. The fuel pipe is now located outside of the frame channel. The oil pan is corrugated to stiffen it and thus permit of a better gasket seal. The starter drive ratio has been increased 14 per cent. The engine mounting has been changed to permit somewhat more freedom of movement. It is of the four-point rubber type, and a torque reaction stabilizer has been added at the rear, in the form of a rubber-cushioned arm extending from the frame side rail to



Both the Pontiac Six and Eight now carry synchromesh transmissions with quiet second speed helical gears and free-wheeling unit located at the rear. This shows a transverse section of the design used on both cars

the rear of the crankcase. Front supports are larger and softer, those at the rear slightly harder, than formerly.

Fan silencing has been improved by an asymmetric blade setting. Clutch release levers have been made adjustable, and the number of clutch springs has been increased from six to nine.

Synchromesh transmissions are of the recent Muncie Products type used on other General Motors cars. Helical constant-mesh gears are used for quiet second speed. The Detroit Gear and Machine Co. type of free-wheeling unit is located at the rear of the transmission, so that it is effective in all forward speeds. Universal joints have an inverted Zerk fitting screwed into the housing to relieve pressure on the joint while it is being filled.

With the exception of the gearshift lever the controls are now all removed from the powerplant. The handbrake lever is mounted on the floorboards of the car. Pedals are mounted on a frame cross-shaft. Both clutch and brake pedals have been designed to permit increased travel and lower pressures. The clutch shaft is hollow and has felt wicking to provide automatic lubrication for an indefinite period. Accelerators are of the treadle type. Pedals have rubber pads.

A durex bushing which also takes end-thrust is mounted in one end of the brake cross-shaft, the latter being hollow, with a rod passing through it. This rod has a spring on the opposite end, and the durex bushing bears on this rod rather than the tubular shaft. The design is intended to decrease rattles and eliminate the necessity for lubricating this unit.

Bendix two-shoe servo-type brakes are now standard equipment, and are cable-actuated. Brake drums are rolled. There are improved oil guards at the front and rear wheels. Frames have been increased in strength through more gusseting. Bumper mounting brackets are now integral. There are three step hangers for each running board.

Spring clips are now of 1/16 in. band stock for a neater fit of the standard fabric spring covers. Delco Products hydraulic shock absorbers, with "ride control" adjustable by the driver, are standard equipment. All connecting links are of the Wahl type, rubber bushed. The adjustment is through an indicating knob located near the steering column on the instrument board.

*January 9, 1932*

## New Pontiac Prices

|  |       |
|--|-------|
| Six-cylinder standard coupe .....                      | \$685 |
| Two-door sedan .....                                   | 695   |
| Sport coupe .....                                      | 755   |
| Four-door sedan .....                                  | 765   |
| Convertible coupe .....                                | 785   |
| Custom sedan .....                                     | 825   |
| Eight-cylinder standard coupe and two-door sedan ..... | 845   |
| Sport coupe .....                                      | 925   |
| Four-door sedan and convertible coupe .....            | 945   |
| Custom sedan .....                                     | 1025  |

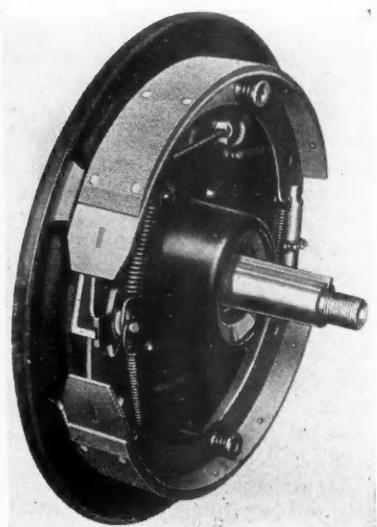
Gasoline-tank capacity has been increased; the muffler rear support has been improved and the tail pipe notched to decrease exhaust noise. Steps for jacking up the car have been provided on the front axle I-beam.

Radiator cores have been changed somewhat in design for increased cooling. Radiator shells have been given a new shape, and grilles have been built into the shell. The radiator splash apron has a neater appearance. Further in the sheet metal, there are door ventilators instead of louvers for the hood, the latter locking with a single central control handle. Fenders at the front have a deeper crown and form the integral hood sill. Rear fenders also have a deeper crown, with the tail of the fender now below the wheel center. From the edge of the rear fender the rear splash apron extends over the gas tank for better chassis concealment. This gas tank guard is provided with stamped-in ribs.

Twin horns are mounted below the headlamps, and twin rear and stop lights are provided on de luxe body models. Instrument boards are of the three-panel type and carry a gasoline gage, a large-face pointer-type speedometer, and a combination oil-pressure and engine-temperature indicator. Both indirect and direct lighting is provided for the instruments, with a separate instrument light switch. Full length bumpers are now shipped with cars for the rear as well as the front.

Windshields are larger and more sloping. There is an interior visor which is universally adjustable to provide protection against the sun from the side as well as through the windshield. All doors are provided with locking handles, including the right front door. Front seats have a sliding type of adjustment.

Bendix two - shoe brakes are now used on both Pontiac six and eight-cylinder cars



*Automotive Industries*

Cowl ventilators have been added at the top center. Sedans have a two-inch wider rear seat, and there is an inch more leg room due to the increase in wheelbase.

Many of the improvements which have been incorporated in the six are found also on the eight. The engine, however, has not been changed to any great extent as compared with the former Oakland Eight. Piston pins are of the new type already mentioned. The engine synchronizer at the front has been moved to the opposite side for better accessibility. The compression ratio has been increased to 5.2 to 1.

## Chrysler Uses "Floating Power" Principle on All Models

(Continued from page 59)

easy, and any forward speed can be engaged while the car is standing still or coasting without pressing down the clutch pedal. On the eights the transmissions are of the same internal-gear, four-speed type as formerly, while on the six there is a transmission with three forward speeds obtained by means of helical gears remaining constantly in mesh.

The X-type frame used in all four Chryslers for 1932 has its two shorter rear legs riveted to the frame at about the rear-spring front hanger. The center of the member is just back of the transmission, with the long front legs extending to the side rails and then being carried forward inside the side rail (forming a box section) until they once more leave the side rail to form the rear gusseting members for the front or engine support cross-member.

Centrifuse brake drums are used, and drum diameters and lining widths have been increased on all lines. The oilite spring inserts referred to previously are disks of a self-lubricating bronze which are placed between the spring plates near their ends. They tend to keep the spring friction constant irrespective of temperature conditions, and reduce the tendency to squeak. Metal spring covers are standard equipment. Oilite springs are not standard on the six.

The split windshields introduced by Chrysler recently are retained, but without the outside visors. The bodies on the six-cylinder line now are similar in general appearance and in contour to those on the Chrysler Eight chassis. On the Imperial and Custom Imperial Eights six wire wheels (with the spares in fender wells) are standard equipment. Standard equipment on these models also includes cigar lighters, clocks and Duplate safety glass throughout. Prices on the Imperial Eights are all expected to be materially lower than formerly.

The specifications accompanying this article indicate further mechanical changes. Fan blades are now unequally spaced for quietness. Radiator cores are thinner than formerly and of greater frontal area for increased cooling capacity. Spark plugs of the 14 mm. type are found on the six as well as on the eights. On the six the tires are larger, while a decrease in the wheel diameter has helped to reduce the overall height.

On the Chrysler Eight the parking brake also has been increased in size. Radiator cores are somewhat thicker than formerly. Owing to the increased length of piston stroke the connecting rod length has been slightly increased. A larger carburetor is used, the spark timing has been revised, and crankshafts are somewhat heavier.

On all eight-cylinder models there is now a combination vacuum booster pump and fuel pump (AC), the

ignition units are now of the single-breaker arm type.

The clutch, which is of the same general design as that on the six, has been increased in size. The transmission is of the same design as that on the six, and the free-wheeling unit also is of the same type as that on the six but larger. Changes already mentioned in connection with clutch pedals, cross-shafts, emergency lever, etc., on the six apply equally to the eight.

Bendix brakes are also used on the eight. Other changes applying to the eight have been described as being on the six. There is new cross-flow radiator on the eights, with a vee-shaped shell of new design.

object of the booster being to maintain a constant windshield wiper speed. The fuel tank capacity on the eight has been increased to nearly 20 gal. There are now two tandem mufflers on the eight, a feature formerly found only on the Imperial, these mufflers being of the acoustic silencer type.

Front springs are slightly longer. There is a new worm-and-roller steering gear with higher ratio for easier steering. Wheels now have drop-center rims and transmission countershafts have roller bearings instead of bronze bushings.

On the Imperial and Imperial Custom Eights the compression ratio is slightly higher than formerly. The engines of these lines now have tool-steel valve inserts, which are expected to increase the periods between valve grindings to 40,000-50,000 miles and also to lessen the frequency of need for tappet adjustments. Powerplant refinements on these models include slightly longer piston pins (for increased bearing surface), new oil-pump gears, a redesigned muffler system and transmission changes as noted in the specifications. The tread has been increased and the rear tread is now over 61 in. These models also carry the new steering gear with larger steering ratio. Front springs are slightly longer than formerly.

Transmission control operations are particularly easy on the Imperials, mainly owing to the smaller steps between gears in the four-speed gearbox. It is claimed that the free-wheeling lockout is very simple to manipulate, it being necessary only to push the dash control in or pull it out while the foot is removed from the accelerator pedal. There is no need for synchronizing gear speeds or kicking out the clutch. Moreover, when the free-wheeling clutch is locked out, the clutch is automatically reengaged, since the two units are interlocked.

### New Chrysler Prices

**Chrysler Six (CI)** although equipped with automatic clutch, price is \$8.00 extra on this model

|                  |       |
|------------------|-------|
| Roadster (r. s.) | \$885 |
| Coupe (r. s.)    | 885   |
| 5-p. sedan       | 895   |
| Conv. coupe      | 935   |

**Chrysler Eight (CP)**

|               |       |
|---------------|-------|
| Coupe (r. s.) | 1,435 |
| Conv. coupe   | 1,495 |
| 5-p. coupe    | 1,475 |
| 5-p. sedan    | 1,475 |

**Standard Imperial Eight (CH)**

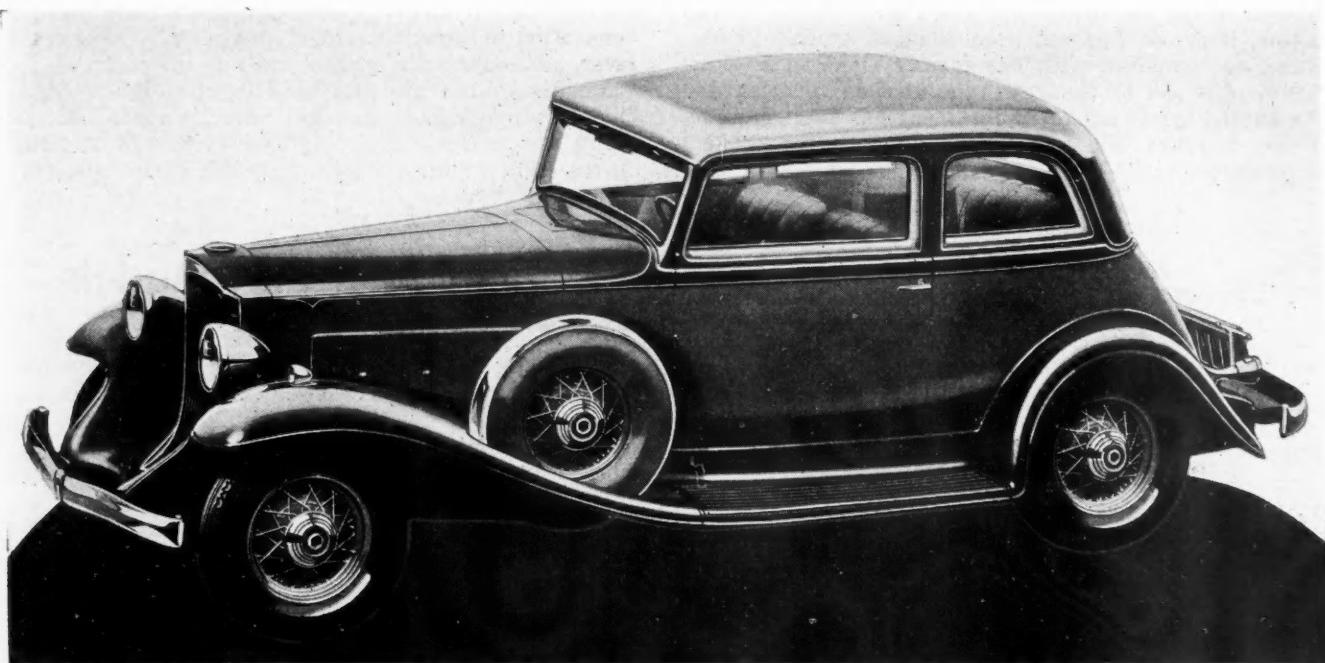
|               |       |
|---------------|-------|
| 5-p. coupe    | 1,945 |
| Coupe (r. s.) | 1,925 |

**Custom Imperial Eight (CL)**

No prices yet.

# Packard Plays for High-Low Markets

(Continued from page 57)



The Packard Light Eight, priced well below \$2,000, reaches a market never before touched by the Packard Motor Car Co. It has a wheelbase of 128 in. This is the five-passenger, two-door, close-coupled sedan

vided on the carburetor air intake. The exhaust is brought from the various ports to a central exhaust manifold passage running backward below the intake manifold and then carried over the top of the block at the right rear and down to the straight through-type muffler. The fuel pump is located directly back of the fan at the front of the engine and to the right, and is driven from a cam on the front end of the camshaft. The fuel tank holds 25 gallons.

Engine lubrication is also interesting. The large oil pump located in the sump formed by the lower section of the crankcase supplies lubricant directly to the main oil gallery leading to the main bearings. The relief valve, which is of the plunger—rather than ball-and-spring-type—is located at the far end of this large  $\frac{5}{8}$ -in. gallery, and is said to be effective in maintaining constant oil pressure at practically all engine speeds. Pressure lubrication is carried to all important bearings in the engine, including wrist-pins. An oil filter is provided as standard equipment. In addition to the bayonet oil level gage an electric gage mounted on the dash is provided. The crankcase ventilator is located in the bottom of the oil filler casting, with an outlet pipe extending to the rear and slightly downward.

Water passages throughout the blocks are of generous size. In fact, the entire water system has a capacity of 10 gal. All water is carried through the blocks up into the cylinder head riser through passages located immediately adjacent to the exhaust valves for maximum cooling of this valve. The water pump is located within the front end cover and is driven by the fan shaft. The latter, together with the generator, is driven through a wide Vee type three-point belt. The  $20\frac{1}{2}$ -in. fan is of the six-bladed aluminum type with asymmetric blade setting for decreased noise. With the large tubular-core radiator provided, relative fan speed is also fairly low. Fans are mounted on ball

bearings and provided with oil reservoirs.

Temperature control is by means of thermostatically operated radiator shutters, chrome-plated and forming a Vee front for the radiator. The shell itself is lacquered, as is a center strip down the front of the Vee.

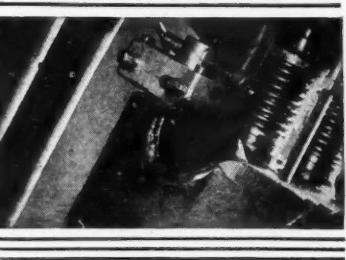
A glance at the engine indicates that in the design much has been applied from Packard's experience with V-type 12-cylinder aircraft engines. An example is the location of all accessories at the front end so that they can all be removed as a unit with the front cover plate after the crankshaft damper has been removed.

Similarly, the entire manifolding and carburetor assembly can be removed by loosening the hold-down flange bolts, making readily accessible the "Vee" of the engine. Rocker arms are not mounted on through shafts but in three groups of eight each, readily removable as units, for ease of servicing.

## Twin-Six Chassis

In addition to the lower sections of the crankcase, the clutch and transmission housing are also of aluminum alloy. The transmission itself is of the same type as previously described in connection with the eights. Universals are the same as used on the De Luxe Eight. Rear axles are of the hypoid type and tilted up in the same manner as in the new light eight, for decreased car height without decrease in road or axle clearance. Other chassis units are similar to the De Luxe Eight, all of the features of which, including the Bijur automatic lubrication system, front-end stabilizer, etc., are to be found on the twin-six.

Frames are of the new X-type, as on the light eight, but instead of the K-type front cross-member, two members, the forward one of which is tubular, are used.



# NEWS OF THE INDUSTRY



## December Production

Hupp Motor Car Corp. has reported shipments of 1044 cars during December, compared with 258 in November and 327 in December, 1930. Total shipments for the year were 17,451 against 22,183 in 1930.

Reo Motor Car Co. has reported production of 688 cars and trucks in December, compared with 736 in November. Shipments for the year totaled 14,021 cars and trucks.

Graham-Paige Motors Corp. has reported production of 1140 passenger and commercial cars during December. Total production for the year was 20,482 against 33,561 for 1930.

H. G. Moock, general sales manager of the Plymouth Motor Corp., has announced that 100,000 Floating Power Plymouths have been sold since the introduction of the car in July, 1931.

Olds Motors Works December production was 2349. Retail sales during December were 2½ times greater than for December, 1930.

## Dodge Trucks at Show

DETROIT, Jan. 6—A new 1½-ton truck at lower prices and a 4-tonner are being exhibited by Dodge Bros. at the New York automobile show. The 1½-ton is available either with a 4-cyl. or two sizes of 6-cyl. engine on wheelbases of 131 in. and 157 in. Features of the 8-cyl., 4-ton include automatic chassis lubrication, oil cooler, valve-seat inserts and exceptionally wide tread at the front as well as the rear.

## Patent Show Planned

PHILADELPHIA, Jan. 7—The Third International Patent Exposition covering all industries, will be held in the Convention Hall here, Feb. 1-10. Automotive and aviation devices will be included in the showings.

**D**O prize contests pay? There's one postal employee in Flint, Mich., who believes they do. He made over \$300 in one day, near the end of the recent Buick contest, delivering special-delivery mail to the Buick offices, from belated contestants who wanted to get their efforts in on time.

The City of Chicago has purchased six new engines for the fire department from American La France Co. They are combination pumper and ladder trucks . . .

Edward Hansen, 19, sets a record for something or other by the recent acquisition of an automobile. His girl's father's car was stolen. "Never mind," said Edward, "I'll have a car in a few days." He arrived soon after with a car much like the girl's father's, but a different color. All went well, and he took his girl's family riding in it, until a traffic cop stopped him and looked at the engine number. It was his girl's father's car—repainted . . .

The police in Tulare, Calif., have recovered every automobile stolen in the city during 1931, except two taken Christmas eve . . . A Chicago detective, cruising in one of the new Nash squad cars, saw a familiar automobile in front of him. He stopped it to find it was his own, stolen from in front of the detective bureau where he had parked it while on duty.

THE  
NEWS  
TRAILER

In this issue (pages 42 to 66) Automotive Industries presents complete technical descriptions of nine automobiles for 1932. These descriptions were prepared by the technical staff of the magazine. Due to the unusual amount of material included it was necessary to defer presentation of descriptions covering the Franklin, Marmon, and Lincoln lines until the issue of Jan. 16. Descriptions of 11 cars have previously appeared. On pages 52-3 of this issue is shown a table of the principal features of all the new models, including those described previous to this issue and those to be described in more detail in a later issue.

## Mayor Walker on S.A.E. Program

NEW YORK, Dec. 7—Mayor James J. Walker of New York, will speak at the annual dinner of the Society of Automotive Engineers Thursday evening, Jan. 14, in Hotel Pennsylvania, New York, Vincent Bendix, president, has announced. John North Willys, U. S. ambassador to Poland, Hon. William P. MacCracken, Jr., former assistant secretary of commerce for aviation, and Senator Ford will also be speakers.

## Chrysler Ships More

DETROIT, Jan. 7—Total shipments of Chrysler built cars for the year 1931, according to final figures just compiled by the Chrysler Corp., were 270,927 against a total of 266,169 for 1930.

## DeSoto Prices Set

DETROIT, Jan. 7—DeSoto Six list prices follow: Standard roadster, \$675; standard coupe, and two-door sedan, \$695; standard rumble seat coupe, \$735; standard sedan and custom roadster, \$775; custom sedan, \$835. Automatic clutch is optional on all models for \$8.00 additional.

## Continental Reports Loss

DETROIT, Jan. 6—Continental Motors and subsidiaries report for the year ended Oct. 31, 1931, a net loss of \$1,899,344, after all charges and depreciation, against a net loss of \$2,037,782 for the 1930 fiscal year.

## Hoffman on Program

DETROIT, Jan. 7—Paul G. Hoffman, president, Studebaker Corp., will be the guest speaker at a banquet of the Twelfth Annual Convention, Michigan Automotive Trade Association, January 27, Hotel Statler.

## Tariff Flexibility Sought in Bill

**Democratic Measure Embodies Views of Automotive Leaders**

WASHINGTON, Jan. 7—Reciprocal tariff arrangements, similar to those which have been suggested by representatives of the automotive industry, are provided for in the Democratic tariff bill which was introduced in the House on Monday of the present week, immediately after Congress reconvened following the Christmas recess. The sudden determination of the Joint Policy Committee of Democrats of the House and the Senate to project the tariff into the legislative program came as a surprise. Democrats have been strongly attacking the present Hawley-Smoot act, and discussion of tariff was inevitable, but it was not contemplated apparently to propose any wide scope of tariff legislation. The decision to do so therefore was unexpected.

The Democratic program is expected to meet with administration opposition. It is a foregone conclusion that the bill will not be enacted into law under the Hoover administration. Its passage in the House seems altogether probable and it is conceivable that by a coalition of Democrats and Progressive Republicans it can pass the Senate. But it will probably be vetoed if it goes to the President and it cannot be passed over his veto because the two-thirds majority to do so does not exist. The Democratic move therefore has been assailed by Republicans as a political gesture which will only delay the President's legislative program looking to business recovery.

The bill provides solely for administrative revision of the tariff law, no rate changes being sought.

The provision for reciprocal trade arrangements is perhaps the most sweeping change suggested, though other far-reaching revisions are carried in the bill. Barring discussion of intergovernmental debts, the bill "requests" the President to initiate a Permanent International Economic Conference with a view to "lowering excessive tariff duties and eliminating discriminatory and unfair trade practices and other economic barriers affecting international trade and finance, preventing retaliatory tariff measures and economic wars and promoting fair, equal and friendly trade and commercial relations between nations." It also proposes that the President "at as early a date as may be convenient to proceed to negotiate with foreign governments reciprocal trade arrangements under a policy of mutual tariff concessions." This would be an entirely new policy of tariff procedure for the United States, although common to Europe.



Soyuzphoto

## Soviet Automobile Plant at

The bill also carries what is known as the Simmons-Norris amendment, proposed when the Hawley-Smoot act was under discussion in the Senate. This amendment would require that the Tariff Commission report to Congress rather than to the President, as at present, on investigations made under the flexible provision, leaving to Congress the power to change rates. It also calls for a "consumer's counsel" for the Tariff Commission.

## Steel Shipments at Higher Rates

**Ford Buying Expected to Give Impetus To Future Market**

NEW YORK, Jan. 7—While the rate at which steel rolling mills catering to automotive consumers were operating during the year's first week was little changed from the pre-holiday scale, shipments were heavier. Ford buying and releases against old contracts are looked for in the near future to give further momentum to the flow of material from rolling mills to parts makers.

Prices, especially in the Detroit market, continue to be under competitive pressure. While the 3c, Pittsburgh, quotation on automobile body stock continues in effect, concessions on seconds are a weakening influence. Prices of as low as 1.40c, Pittsburgh, for hot-rolled strip over 6 in. and 1.50c for the 6 in. and under which came out in one sale to an automotive consumer are thought to have been exceptional because of the tonnage involved and the market as a whole is considered to be \$1 above these levels, with producers ambitious to lift prices another \$1 so soon as demand shows signs of broadening. Cold-rolled strip seems to have gone definitely to 2c, Pittsburgh and Cleveland.

Prices for steel bars which in some transactions have dipped as low as 1.50c, Pittsburgh, are far from satisfactory to mills and efforts by the

largest Middle West "independent" to advance the price by \$2 a ton are accepted as indication that the bottom of the market has been reached. Automotive alloy steels are in slightly better inquiry. Non-integrated sheet mills are now able to cover their sheet bar requirements at \$28, Pittsburgh, Youngstown or Cleveland.

**Pig Iron**—The market continues to mark time with prices generally attractive to meltters. Although the number of active furnaces has been further curtailed and production has not been so light since 1921, automotive foundries continue to take on iron only as required for their immediate casting schedules.

**Aluminum**—Quiet and unchanged.

**Copper**—While electrolytic was to be had at 6 1/4c, delivered Connecticut, on Monday, the market is nominally quoted at 7 1/4c, this being due to the absence of buyers and sellers being unwilling to revise quotations downwards in the absence of firm bids.

**Tin**—Straits tin was offered at 21 1/2c at the beginning of the week. Consumers showed better interest, but actual demand was light.

**Lead**—Quiet and unchanged.

**Zinc**—Dull, but steady.

## Federal Names Mitchell

Federal Motor Truck Co. has announced the appointment of S. G. Mitchell as advertising manager, effective as of Dec. 1, 1931. Mr. Mitchell has been continuously connected with the Federal organization since 1913 and has been in charge of the advertising department since March, 1930.

## Timken Schedule Up

CANTON, OHIO, Jan. 5—At the plant of The Timken Roller Bearing Co., increased working schedules are being put into effect for January. Although no increase is being made in the number of men employed at the present time, the plant has been put on an operating schedule of 20 days for the month.

## Indian Plans New Type

SPRINGFIELD, MASS., Jan. 7—Indian Motorcycle will put a new light sport model in production about June 1. It will have general characteristics of the new Indian line, but will be 60 per cent lighter than the standard. It will be powered with a two-cylinder engine.



## Nizhni Novgorod is Formally Opened for New Year

Construction on the gigantic Nizhni Novgorod plant was completed Nov. 1, but formal opening of the plant was deferred until Jan. 1. In size and productive capacity the plant is said to be unparalleled in Europe and to have no equal in the United States except at River Rouge. In the project there are 23 main buildings covering an area of 2,294,000 sq. ft. Expenditures for tools and equipment reached \$18,-

000,000, a large part of which was spent in the United States. Production program has been set at 70,000 Ford-type trucks and 50,000 Ford-type passenger cars annually, under an agreement by which the Ford Motor Co. (Dearborn) is to furnish technical assistance. The illustration shows construction on the Nizhni Novgorod plant as the main buildings neared completion.

## Financing Reaches Low in November

### Wholesale Volume Takes Sudden Drop After Holding Well

**WASHINGTON**, Jan. 7—Wholesale financing of automobiles for the month of November reached a volume of \$15,742,672, the lowest monthly total in more than two years for this classification, according to preliminary figures on automobile financing released by the Bureau of the Census, Department of Commerce. For the month of November, 1930, the volume at wholesale was \$29,632,626. For the first eleven months of 1930 the volume was \$625,435,438, which dropped to an indicated \$525,229,529 in the first 11 months of 1931.

Retail financing was divided as follows:

|                    | Total         | Average Per Car |
|--------------------|---------------|-----------------|
| Nov., 1931 .....   | \$48,658,954  | \$371           |
| Nov., 1930 .....   | 60,197,277    | 395             |
| 11 mos. 1931 ..... | 900,376,846   | 389             |
| 11 mos. 1930 ..... | 1,136,109,655 | 410             |

**OTTAWA**, Jan. 4—The figures for automobile financing compiled by the Dominion Bureau of Statistics show a decrease for November as compared with October of this year, and indicate a falling off in financing as compared with the corresponding month in 1930.

The total number of cars financed was 5125 in November, 1931; 6435 in October, 1931, and 6783 in November, 1930, and the amount of financing was

\$2,130,469 in November, 1931; \$2,662,144 in October, 1931, and \$3,038,082 in November, 1930.

New cars financed were 1299 in November, 1931; 1891 in October, 1931, and 1594 in November, 1930; while used cars financed were 3826 in November, 1931; 4544 in October, 1931, and 5189 in November, 1930.

Financing of new cars amounted to \$976,658 in November, 1931; \$1,324,452 in October, 1931, and \$816,948 in November, 1930. Financing of used cars amounted to \$1,153,811 in November, 1931; \$1,337,692 in October, 1931, and \$2,221,134 in November, 1930.

### Graham Schedules Up

**DETROIT**, Jan. 6—Production of the new Graham Blue Streak Eight last month was the largest December output since 1925 and the largest single month's production of eight-cylinder cars in the history of Graham-Paige Motors Corp. Unfilled orders on Jan. 1 were twice as many as at the beginning of last year and original production schedules for January have been stepped up to fill demand. Nine hundred workers have been added to the payroll.

### Lycoming Orders Up

**WILLIAMSPORT, PA.**, Jan. 7—A sharp increase in orders for aircraft engines is reported today by officials of the Lycoming Mfg. Co., a division of the Cord Corp. Orders now on hand for the nine-cylinder, 215 hp. radial engines total \$673,000, as compared with orders totaling \$145,400 for aircraft engines in December, 1930.

## Asks Receiver For Rolls-Royce

### Minority Bondholder Goes Against Protective Committee

**SPRINGFIELD, MASS.**, Jan. 5—In relation to the suit brought in United States District Court for appointment of a receiver for Rolls-Royce of America, Inc., by M. Hurewitz, holder of ten \$1,000 bonds of the corporation, Henry S. Keyes, president of the corporation said that as the holding referred to constituted only 1 per cent of the total amount of bonds outstanding he doubted if a receivership would be set on this petition.

In addition to \$1,000,000 in bonds the concern has issued preferred stock to the amount of \$3,500,000 and 35,000 shares of common stock of no par value.

The company defaulted payment of semi-annual interest due Sept. 1 on the bonds, which bear 7 per cent, and a protective committee headed by William Card Moore was formed, with which a majority of bondholders deposited their securities.

Operations on chassis at the East Springfield works at present are confined to repair work.

### Gets Railcar Rights

**PHILADELPHIA**, Jan. 7—A pneumatic-tired stainless-steel unit railcar is nearing completion in the Philadelphia plant of the Edward G. Budd Mfg. Co., it was announced today, when the organization announced the signing of a contract with Michelin et cie, of France, giving it the right to develop and sell in this country the "Micheline" car. The French product will take on various refinements and improvements as a result of developments in the use of light-gage stainless steel recently completed by Budd engineers, officials of that company have said.

## Business in Brief

**Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries**

**NEW YORK, Jan. 6**—Retail trade is again at approximately the same level as before the holiday business began. Wholesale and jobbing lines remain within very narrow limits. The heavy industries are quiet. The dollar value of the holiday trade in New York and vicinity was about 7½ per cent below that a year ago, according to the Federal Reserve Bank of New York.

### CAR LOADINGS

Railway freight loadings during the week ended Dec. 19 totaled 581,733 cars, which marks a decrease of 31,801 cars below those during the preceding week, a decrease of 132,132 cars below those a year ago and a decrease of 261,042 cars below those two years ago.

### ELECTRICITY OUTPUT

Production of electricity by the electric light and power industry during the week ended Dec. 26 totaled 1,564,652,000 kilowatt hours, which marks a decline of 3.3 per cent below that a year ago.

### LIFE INSURANCE SALES

Sales of ordinary life insurance in the United States during the first 10 months of 1931 were 15 per cent below those in the corresponding period of 1930. The trend during the last few months, however, has been upward; and sales during November were only 4 per cent below those a year ago.

### CRUDE OIL OUTPUT

Average daily crude oil production during the week ended December 26 amounted to 2,292,200 barrels, as against 2,430,300 barrels for the preceding week and 2,126,750 barrels a year ago.

### LUMBER ORDERS

Lumber orders for the week ended Dec. 19 were 30 per cent above the low cut of 118,677,000 feet, while shipments were 8 per cent above this figure, according to the National Lumber Manufacturers Association.

### FISHER'S INDEX

Professor Fisher's index of wholesale commodity prices for the week ended Jan. 2 stood at 66.7, as against 66.7 the week before and 67.0 two weeks before.

### STOCK MARKET

The stock market last week was not very spectacular, with fluctuations for the most part quite narrow. What liquidation occurred is regarded as selling for the purpose of establishing losses in income tax returns. Trading was on a fairly large scale. Net changes for the week were in general small.

### RESERVE STATEMENT

There was a large expansion in Federal Reserve credit outstanding during the week ended Dec. 30. The consolidated statement of the Federal Reserve banks for that week shows increases of \$113,000,000 in holdings of discounted bills, of \$70,000,000 in holdings of bills bought in the open market, and of \$45,000,000 in holdings of Government securities. The reserve ratio on Dec. 30 was 61.9 per cent, as against 64.4 per cent a week earlier and 65.0 per cent two weeks earlier.

## Gasoline Consumption in October Rose 3.4 Per Cent Over 1930

**NEW YORK, Jan. 6**—Gasoline consumption in 47 states and the District of Columbia for the month of Oct., 1931, as indicated by reports made by wholesalers and dealers in the various states, under provisions of the gasoline tax laws or gasoline inspection laws, totaled 1,343,129,000 gal., compared with 1,299,031,000 gal. in Oct., 1930, an increase of 44,098,000 gal., or 3.4 per cent, according to the American Petroleum Institute. Daily average consumption for Oct., 1931,

was 43,327,000 gal., compared with a daily average of 45,506,000 gal. in Sept., 1931, a decrease in daily average during the month of October of 4.8 per cent.

Gasoline consumption in these 47 states and the District of Columbia for the 10 months ending with Oct., 1931, amounted to 12,713,745,000 gal., compared with 12,157,466,000 gal. for the corresponding period of 1930, an increase of 556,279,000 gal., or 4.6 per cent.

### Gasoline Consumption by States, October, 1931

|  | Tax per Gallon<br>Cents | Month of               |                       | 10 Months Ending With |                       |
|--|-------------------------|------------------------|-----------------------|-----------------------|-----------------------|
|  |                         | Sept., 1931<br>Gallons | Oct., 1931<br>Gallons | Oct., 1931<br>Gallons | Oct., 1930<br>Gallons |
| Alabama . . . . .                              | 5                       | 13,803,000             | 14,026,000            | 14,907,000            | 137,846,000           |
| Arizona . . . . .                              | 5                       | 6,151,000              | 6,208,000             | 6,335,000             | 62,649,000            |
| Arkansas . . . . .                             | 6                       | 13,576,000             | 10,132,000            | 12,765,000            | 107,777,000           |
| Colorado . . . . .                             | 4                       | 15,078,000             | 14,985,000            | 14,930,000            | 153,682,000           |
| Connecticut . . . . .                          | 2                       | 22,152,000             | 22,192,000            | 20,328,000            | 189,337,000           |
| Delaware . . . . .                             | 3                       | 3,712,000              | 3,490,000             | 3,225,000             | 32,247,000            |
| Dist. of Col. . . . .                          | 2                       | 8,126,000              | 8,508,000             | 7,414,000             | 77,688,000            |
| Florida . . . . .                              | 7                       | 16,557,000             | 18,218,000            | 17,490,000            | 192,942,000           |
| Georgia . . . . .                              | 6                       | 18,544,000             | 19,592,000            | 19,569,000            | 185,820,000           |
| Idaho . . . . .                                | 5                       | 6,152,000              | 5,640,000             | 5,952,000             | 51,677,000            |
| Illinois . . . . .                             | 3                       | 95,183,000             | 93,494,000            | 90,360,000            | 860,527,000           |
| Indiana . . . . .                              | 4                       | 44,205,000             | 42,449,000            | 42,423,000            | 409,330,000           |
| Iowa . . . . .                                 | 3                       | 33,790,000             | 35,224,000            | 35,592,000            | 354,650,000           |
| Kansas . . . . .                               | 3                       | 31,074,000             | 30,568,000            | 29,361,000            | 353,121,000           |
| Kentucky . . . . .                             | 5                       | 16,432,000             | 16,060,000            | 15,426,000            | 148,048,000           |
| Louisiana . . . . .                            | 5                       | 16,804,000             | 17,394,000            | 16,397,000            | 157,263,000           |
| Maine . . . . .                                | 4                       | 13,168,000             | 11,545,000            | 11,065,000            | 99,541,000            |
| Maryland . . . . .                             | 4                       | 18,169,000             | 17,382,000            | 16,929,000            | 158,564,000           |
| Massachusetts . . . . .                        | 3                       | 53,832,000             | 53,731,000            | 48,395,000            | 480,522,000           |
| Michigan . . . . .                             | 3                       | 69,469,000             | 70,327,000            | 70,424,000            | 677,276,000           |
| Minnesota . . . . .                            | 3                       | 38,761,000             | 40,067,000            | 37,717,000            | 379,653,000           |
| Mississippi . . . . .                          | 5                       | *11,042,000            | *11,221,000           | 11,590,000            | *110,274,000          |
| Missouri . . . . .                             | 2                       | 43,249,000             | 43,372,000            | 40,623,000            | 406,099,000           |
| Montana . . . . .                              | 5                       | 6,239,000              | 6,945,000             | 7,370,000             | 67,259,000            |
| Nebraska . . . . .                             | 4                       | 18,976,000             | 19,880,000            | 19,702,000            | 197,744,000           |
| Nevada . . . . .                               | 4                       | 2,173,000              | 2,006,000             | 1,633,000             | 19,953,000            |
| N. Hampshire . . . . .                         | 4                       | 7,505,000              | 6,736,000             | 6,020,000             | 58,662,000            |
| New Jersey . . . . .                           | 3                       | 53,773,000             | 50,865,000            | 48,690,000            | 484,551,000           |
| New Mexico . . . . .                           | 5                       | 4,551,000              | 4,410,000             | 4,864,000             | 44,625,000            |
| New York . . . . .                             | 2                       | 154,946,000            | 149,129,000           | 136,503,000           | 1,370,542,000         |
| N. Carolina . . . . .                          | 6                       | 23,814,000             | 24,974,000            | 22,563,000            | 202,541,000           |
| N. Dakota . . . . .                            | 3                       | 10,229,000             | 9,629,000             | 10,329,000            | 103,030,000           |
| Ohio . . . . .                                 | 4                       | 87,171,000             | 86,548,000            | 87,758,000            | 834,420,000           |
| Oklahoma . . . . .                             | 5                       | 27,284,000             | 25,138,000            | 27,196,000            | 257,966,000           |
| Oregon . . . . .                               | 4                       | 15,948,000             | 14,670,000            | 15,197,000            | 150,446,000           |
| Pennsylvania . . . . .                         | 3                       | 102,953,000            | 101,436,000           | 91,702,000            | 887,093,000           |
| Rhode Island . . . . .                         | 2                       | 8,905,000              | 8,597,000             | 7,760,000             | 82,757,000            |
| S. Carolina . . . . .                          | 6                       | 10,730,000             | 10,718,000            | 10,815,000            | 101,597,000           |
| S. Dakota . . . . .                            | 4                       | 10,780,000             | 11,129,000            | 11,705,000            | 118,293,000           |
| Tennessee . . . . .                            | 6                       | 19,849,000             | 19,009,000            | 20,750,000            | 176,772,000           |
| Texas . . . . .                                | 4                       | 69,486,000             | 70,948,000            | 66,242,000            | 695,270,000           |
| Utah . . . . .                                 | 4                       | 5,364,000              | 4,918,000             | 5,320,000             | 52,172,000            |
| Vermont . . . . .                              | 4                       | 5,614,000              | 5,002,000             | 4,799,000             | 41,952,000            |
| Virginia . . . . .                             | 5                       | 23,340,000             | 22,955,000            | 22,348,000            | 203,364,000           |
| Washington . . . . .                           | 5                       | 24,438,000             | 24,483,000            | 22,560,000            | 233,059,000           |
| W. Virginia . . . . .                          | 4                       | 14,891,000             | 14,044,000            | 13,663,000            | 120,150,000           |
| Wisconsin . . . . .                            | 4                       | 43,429,000             | 41,639,000            | 41,187,000            | 388,505,000           |
| Wyoming . . . . .                              | 4                       | 3,774,000              | 3,493,000             | 3,138,000             | 34,489,000            |
| Total . . . . .                                |                         | 1,365,191,000          | 1,343,129,000         | 1,299,031,000         | 12,713,745,000        |
| Daily Average . . . . .                        |                         | 45,506,000             | 43,327,000            | 41,904,000            | 41,822,000            |
| Increase over previous year:                   |                         |                        |                       |                       |                       |
| Amount of Increase . . . . .                   |                         |                        | 44,098,000            |                       | 556,279,000           |
| Percentage Increase in Daily Average . . . . . |                         |                        | 3.4%                  |                       | 4.6%                  |

\*Estimated. †Revised.

## National Credit Names Davidson

Homer Davidson, formerly field secretary of the N. S. P. A., has been placed in charge of the new Detroit office of the National Credit Office in the First National Bank Building. A complete file of current information on 15,000 wholesalers and jobbers as well as credit information of practically every manufacturer associated with the automotive industry will be kept in the new office. The company has

headquarters in New York, and its automotive headquarters are in Cleveland.

## Sir William Letts Sails

Sir William Letts, managing director of Willys-Overland Crossley, Ltd., Stockport, England, has sailed for Canada to confer with T. A. Russell, president of Willys-Overland, Ltd., Toronto. During his stay on this side of the Atlantic Sir William will also visit Toledo and New York.

## Total Vehicle Registrations for 1931 Estimated to Drop 1.9 Per Cent from '30

PHILADELPHIA, Jan. 6—Total registrations of motor vehicles in the United States for the year 1931 are estimated by *Automotive Industries* to have reached 26,190,083, compared with 26,657,072 for the year 1930, a decline of approximately 1.9 per cent. The estimates are based on official returns from motor vehicle authorities in 42 states, with hypothesized returns from 7 states. In the commercial vehicle category, the decline in

registrations (1930-1931) was 0.5 per cent.

The returns indicate that 15 states will show an increase in total registrations of motor vehicles for the year 1931. These states are California, Connecticut, District of Columbia, Maine, Maryland, Nevada, New Hampshire, New Jersey, New York, Ohio, Oregon, Pennsylvania, Virginia, and Wyoming. The returns by states, in tabular form, are shown herewith.

### Motor Vehicle Registrations, 1931

|                         | Passenger Cars         | Trucks    | Buses               | Total Motor Vehicles | Motorcycles | Trailers |
|-------------------------|------------------------|-----------|---------------------|----------------------|-------------|----------|
| <sup>1</sup> Alabama    | 213,626                | 33,895    | †                   | 247,521              | 593         | 3,279    |
| Arizona                 | 92,939                 | 12,633    | ...                 | 105,572              | 379         | 1,623    |
| Arkansas                | 189,000                | 26,000    | ...                 | 215,000              | 375         | 2,800    |
| California              | 1,970,397 <sup>4</sup> | 105,016   | ...                 | 2,075,413            | 10,050      | 55,021   |
| Colorado                | 274,500                | 30,100    | ...                 | 304,600              | 960         | ...      |
| Connecticut             | 300,300                | 48,000    | 950                 | 349,250              | 2,580       | 1,050    |
| Delaware                | 45,559                 | 9,901     | ...                 | 55,460               | 325         | 500      |
| District of Columbia    | 155,000                | 19,000    | ...                 | 174,000              | 1,000       | ...      |
| Florida                 | 274,000                | 52,000    | †                   | 326,000              | 1,156       | 6,568    |
| Georgia                 | 275,179                | 45,496    | †                   | 320,675              | 1,033       | 3,215    |
| Idaho                   | 97,000                 | 16,000    | *                   | 113,000              | 365         | 8,000    |
| Illinois                | 1,420,000              | 202,000   | *                   | 1,622,000            | 5,800       | 9,200    |
| Indiana                 | 732,000                | 129,000   | 1,040               | 862,040              | 2,800       | 1,200    |
| Iowa                    | 674,388                | 79,049    | †                   | 753,428              | 1,680       | 3,052    |
| Kansas                  | 481,550                | 80,775    | ...                 | 562,325              | 1,097       | 1,825    |
| Kentucky                | 292,306                | 36,330    | 544                 | 329,180              | 800         | ...      |
| Louisiana               | 219,189                | 49,634    | ...                 | 268,823              | 759         | 5,472    |
| Maine                   | 147,088                | 35,000    | 100                 | 182,188              | 1,000       | 2,500    |
| Maryland                | 288,860                | 36,008    | 1,177               | 326,045              | 1,743       | 1,128    |
| Massachusetts           | 735,000                | 102,000   | 3,000               | 840,000              | 4,600       | 650      |
| Michigan                | 1,078,380              | 152,651   | ...                 | 1,231,031            | 3,239       | 62,013   |
| Minnesota               | 609,586                | 110,400   | 272                 | 720,258              | 1,880       | 17,934   |
| Mississippi             | 201,000                | 31,500    | ...                 | 232,500              | 217         | 3,800    |
| Missouri                | 668,000                | 90,750    | *                   | 758,750              | 1,700       | 5,200    |
| Montana                 | 105,000                | 24,000    | ...                 | 129,000              | 220         | 60       |
| Nebraska                | 365,000                | 58,000    | 215                 | 423,215              | 775         | 15,000   |
| Nevada                  | 25,000                 | 6,800     | ...                 | 31,800               | 75          | 400      |
| New Hampshire           | 94,000                 | 18,000    | 120                 | 112,120              | 1,100       | 1,200    |
| New Jersey              | 727,294                | 133,012   | 5,370               | 865,676              | 5,642       | 2,867    |
| New Mexico              | 60,000                 | 15,000    | 358                 | 75,358               | 193         | 760      |
| New York                | 1,933,000              | 338,700   | 47,400 <sup>5</sup> | 2,319,100            | 13,700      | 13,000   |
| North Carolina          | 376,500                | 57,500    | 300                 | 434,300              | 1,500       | 8,500    |
| North Dakota            | 144,648                | 26,494    | ...                 | 171,142              | 228         | ...      |
| Ohio                    | 1,560,000              | 205,000   | *                   | 1,765,000            | 7,300       | 32,300   |
| Oklahoma                | 490,000                | 58,000    | ...                 | 548,000              | 1,200       | ...      |
| <sup>2</sup> Oregon     | 243,264                | 37,040    | 884                 | 281,188              | 1,691       | 2,361    |
| Pennsylvania            | 1,527,729              | 239,914   | 8,056               | 1,775,699            | 12,405      | 6,337    |
| Rhode Island            | 118,290                | 20,150    | 535                 | 138,975              | 890         | 90       |
| South Carolina          | 182,050                | 25,000    | †                   | 207,050              | 650         | 2,100    |
| South Dakota            | 174,869                | 24,942    | 189                 | 200,000              | 752         | 40,019   |
| Tennessee               | 322,374                | 33,811    | †                   | 356,185              | 1,225       | 3,000    |
| Texas                   | 1,093,250              | 207,500   | 1,440               | 1,302,190            | 3,750       | 30,950   |
| Utah                    | 91,600                 | 17,550    | *                   | 109,150              | 500         | 268      |
| Vermont                 | 75,260                 | 8,437     | 141                 | 83,838               | 502         | 450      |
| Virginia                | 323,300                | 62,000    | 779                 | 386,079              | 2,050       | 1,600    |
| <sup>3</sup> Washington | 363,079                | 62,857    | 1,764               | 427,700              | 1,876       | 3,000    |
| West Virginia           | 216,002                | 36,350    | 773                 | 253,125              | 1,300       | 1,226    |
| Wisconsin               | 641,090                | 113,514   | 530                 | 755,134              | 2,611       | 976      |
| Wyoming                 | 52,000                 | 12,000    | †                   | 64,000               | 115         | ...      |
| Totals                  | 22,739,446             | 3,374,700 | 75,937              | 26,190,083           | 108,361     | 362,494  |

<sup>1</sup> Fiscal year from Oct. 1, 1930, to Sept. 30, 1931.

<sup>2</sup> Fiscal year from July 1, 1930, to June 30, 1931.

<sup>3</sup> For fiscal year ending Nov. 30, 1931.

<sup>4</sup> Includes all commercial vehicles under 3000 lb.

<sup>5</sup> Included with trucks.

<sup>6</sup> Included with passenger cars.

<sup>7</sup> Includes taxicabs.

### Safety Prizes Awarded

NEW YORK, Jan. 4—Highway Education Board has announced the prize winners in its annual Street and Highway Safety Essay Contest. The student prizes, which will consist of gold watches to be presented at the National Capital, go to Jesse Messick of Hughesville High School, Benedict, Md., and Miles Patterson, Starkville High School, A. & M. College, Mississippi.

First prize for the best safety lesson, awarded to teachers, goes to Mrs. Pearl B. Dyer, Gregory, S. D., and

consists of \$500. The other first prize goes to Miss Kathryn Smith, Lincoln High School, Salt Lake City, Utah.

### Canadian Willys Resumes

TORONTO, Jan. 4—Willys-Overland Co., Ltd., whose Weston Road plant, on the outskirts of Toronto, manufactures Willys and Willys-Knight motor cars, will shortly be swinging into a production which will mean more men at work. In an address T. K. Jones, assistant general manager of the company, said: "Our factory will begin operations soon after the holiday

season and we will try in every way possible to make this mean employment for every man it is possible for us to use."

## Diesel Motivates 14-Day Test

### Cummins Engine Used for Lubrication Experiments at Indianapolis

INDIANAPOLIS, IND., Jan. 4—A truck equipped with a six-cylinder Cummins Diesel engine has recently completed an endurance run of nearly 15,000 miles on the Speedway here. It ran 10,005 miles without refueling, 13,535 miles without stopping, and 14,500 miles without an engine stop. The engine ran continuously for 14 days and nights and it is stated that the only reason the truck did not make a non-stop run was that one of the wheels came loose after the first day and had to be tightened.

The total cost of the fuel and lubricating oil used during the test is said to have been \$75.54, or slightly more than one-half cent per mile. In this connection it is worth mentioning that the average speed during the test was over 43 m.p.h. The test was made under A.A.A. sanction, and Charles Merz, Indiana representative, was in charge. It was held with the cooperation of the Continental Oil Co., which desired to secure data on the lubrication of high-speed Diesel engines.

At the beginning of the test the 2½-ton truck had a gross weight of 21,000 lb., carrying 908 gal. of fuel oil, and was therefore greatly overloaded, yet it averaged more than 10 miles to the gallon of fuel oil. The truck averaged 43.41 m.p.h. throughout the run and showed a top speed of 65 m.p.h. All of these figures are subject to confirmation by the A.A.A. Contest Board, but it is not expected that they will be materially changed. The fuel used cost 4.9 cents at retail, it is stated. Since 1460 gal. of fuel oil were used the fuel cost amounted to \$71.54.

The run began at 2 p.m. on Dec. 12, and stopped at 2 p.m. on Dec. 26, when C. L. Cummins of the Cummins Engine Co., who staged the test, decided to quit because he had accomplished all he set out to do. Mr. Cummins is building 25 engines of the new six-cylinder truck and bus type and will place them in trucks in various parts of the country for actual service tests. He has already completed his factory tests.

### Mansfield Recovers From Illness

John D. Mansfield, president and general manager of the Chrysler Corp. of Canada, Ltd., has recovered satisfactorily from a recent serious operation.

## Diamond T Sales Above 1930 Mark

CHICAGO, Jan. 4—Sales of Diamond T motor trucks in 1931 showed an increase over the 1930 total, E. J. Bush, president Diamond T Motor Car Co., announces. The gain, he states, was largely due to the record made during the final seven months, when the increase over the corresponding period of the previous year amounted to 32 per cent.

Stating that the showing for the final seven months indicates business is finally on the upgrade, Mr. Bush said:

"Orders from large fleet users of trucks accounted largely for the increase, such firms entering the replacement market on an extensive scale. I expect a continuance of this trend during the current year and anticipate a policy by smaller truck users of entering the new truck market since a great number of them have operated their vehicles over a longer time and mileage basis than is economically advisable."

Introduction of low-priced 1½-ton models by Diamond T is named as an important factor in the 1931 sales record.

## Carpenter Patents Steel

READING, PA., Jan. 4—Free-machining stainless steels with abnormal sulphur content are now covered by U. S. Patent No. 1,835,960, issued to the Carpenter Steel Co., according to an announcement made here. The broadest claim in the patent reads:

"As a composition of matter, a corrosion-resisting alloy steel containing essentially between 7 per cent and 30 per cent of chromium, and between 0.15 per cent and 1.80 per cent of sulphur, and characterized by anti-friction quality."

Bellanca Aircraft Corp. reports that 1931 was the best year in its history, with volume of sales (in dollars) exceeding the 1930 figure by 25 to 30 per cent.

## ++ CALENDAR ++ OF COMING EVENTS

### SHOWS

|  |                |
|--|----------------|
| National Automobile, New York              | Jan. 9-16      |
| San Francisco, Automobile                  | Jan. 9-16      |
| Lansing, Mich., Automobile                 | Jan. 11-16     |
| Flint, Mich., Automobile                   | Jan. 13-16     |
| Newark, N. J., Automobile                  | Jan. 16-23     |
| Omaha, Neb., Automobile                    | Jan. 16-23     |
| Toledo, Ohio, Automobile                   | Jan. 16-22     |
| Cincinnati, Automobile                     | Jan. 17-23     |
| Milwaukee, Wis., Automobile                | Jan. 17-23     |
| Philadelphia, Automobile                   | Jan. 18-23     |
| Louisville, Ky., Automobile                | Jan. 18-23     |
| Columbus, Ohio, Automobile                 | Jan. 23-28     |
| Boston, Mass., Automobile                  | Jan. 23-30     |
| Minneapolis, Minn., Automobile             | Jan. 23-30     |
| Hartford, Conn., Automobile                | Jan. 23-30     |
| Detroit, Automobile                        | Jan. 23-30     |
| Montreal, Automobile                       | Jan. 23-30     |
| Baltimore, Automobile                      | Jan. 23-30     |
| Pittsburgh, Pa., Automobile                | Jan. 23-30     |
| Portland, Ore., Automobile                 | Jan. 23-30     |
| Springfield, Mass., Automobile             | Jan. 25-30     |
| Harrisburg, Pa., Automobile                | Jan. 25-30     |
| Seattle, Wash., Automobile                 | Jan. 25-30     |
| St. Petersburg, Fla., Automobile           | Jan. 27-29     |
| National Automobile, Chicago               | Jan. 30-Feb. 6 |
| Salon, Chicago                             | Jan. 30-Feb. 6 |
| Washington, D. C., Automobile              | Jan. 30-Feb. 6 |
| Cleveland, Automobile                      | Jan. 30-Feb. 6 |
| Springfield, Ill., Automobile              | Feb. 4-6       |
| Plainfield, N. J., Automobile              | Feb. 6-13      |
| St. Paul, Minn., Automobile                | Feb. 6-13      |
| St. Louis, Automobile                      | Feb. 7-13      |
| Denver, Colo., Automobile                  | Feb. 8-13      |
| Indianapolis, Ind., Automobile             | Feb. 13-19     |
| Salon, Los Angeles, Calif.                 | Feb. 13-20     |
| Kansas City, Automobile                    | Feb. 13-20     |
| Mankato, Minn., Automobile                 | Feb. 17-20     |
| Peoria, Ill., Automobile                   | Feb. 17-21     |
| Holyoke, Mass., Automobile                 | Feb. 18-22     |
| Des Moines, Iowa, Automobile               | Feb. 21-26     |
| Wichita, Kan., Tractor and Power Equipment | Feb. 23-26     |
| Salon, San Francisco, Calif.               | Feb. 27-Mar. 5 |
| Albany, N. Y., Automobile                  | Feb. 27-Mar. 5 |
| Berne, Switzerland, Automobile             | Mar. 11-20     |
| National Aircraft, Detroit, Mich.          | Apr. 2-10      |

### CONVENTIONS

|   |                  |
|---|------------------|
| American Roadbuilders Association, Detroit, Mich.   | Jan. 11-14, 1932 |
| S.A.E. Annual Dinner, New York City                 | Jan. 14          |
| S.A.E. Annual Meeting, Detroit, Mich.               | Jan. 25-29       |
| Nat. Assoc. of Engine and Boat Mfrs., New York City | Jan. 29          |

## Stinson Cuts Price On 4-Pass. Type

CHICAGO, Jan. 4—Numerous engineering refinements distinguish the line of four-passenger cabin airplanes announced for 1932 by the Stinson Aircraft Corp., of Wayne, Mich., a division of the Cord Corp.

A new low price of \$4,495 has been fixed for planes in this series, known as the model "S" and powered with a 215 hp. Lycoming radial engine, L. B. Manning, vice-president of the Cord Corp., announced today.

Stinson also will announce a new de luxe model "R" four-passenger cabin plane early in the spring, Mr. Manning said. In addition to de luxe appointments throughout, this new plane will be considerably faster than the present model "S." It has been designed to sell in a slightly higher price class.

## Russell Motor Declares

TORONTO, Jan. 3—Directors of Russell Motor Car Co. have declared the regular dividend on the preferred shares amounting to 1¼ per cent for the three months ending Jan. 31, payable Feb. 1.

The dividend on the common shares was reduced to an annual rate of 2 per cent. The dividend of ½ of 1 per cent was a reduction of ¼ of 1 per cent from the last quarterly payment. The common dividend was declared for the three months ending Dec. 31, and is payable Feb. 1.

## Outboard Reports Loss

CHICAGO, Jan. 4—Operations of Outboard Motors Corp. for the fiscal year ended Sept. 30, 1931, resulted in net loss of \$194,234 after all charges including depreciation and inventory write-down. Due to change in the accounting system no comparable figures are available, but for the nine months ended Sept. 30, 1930, net loss of \$131,066 was reported.

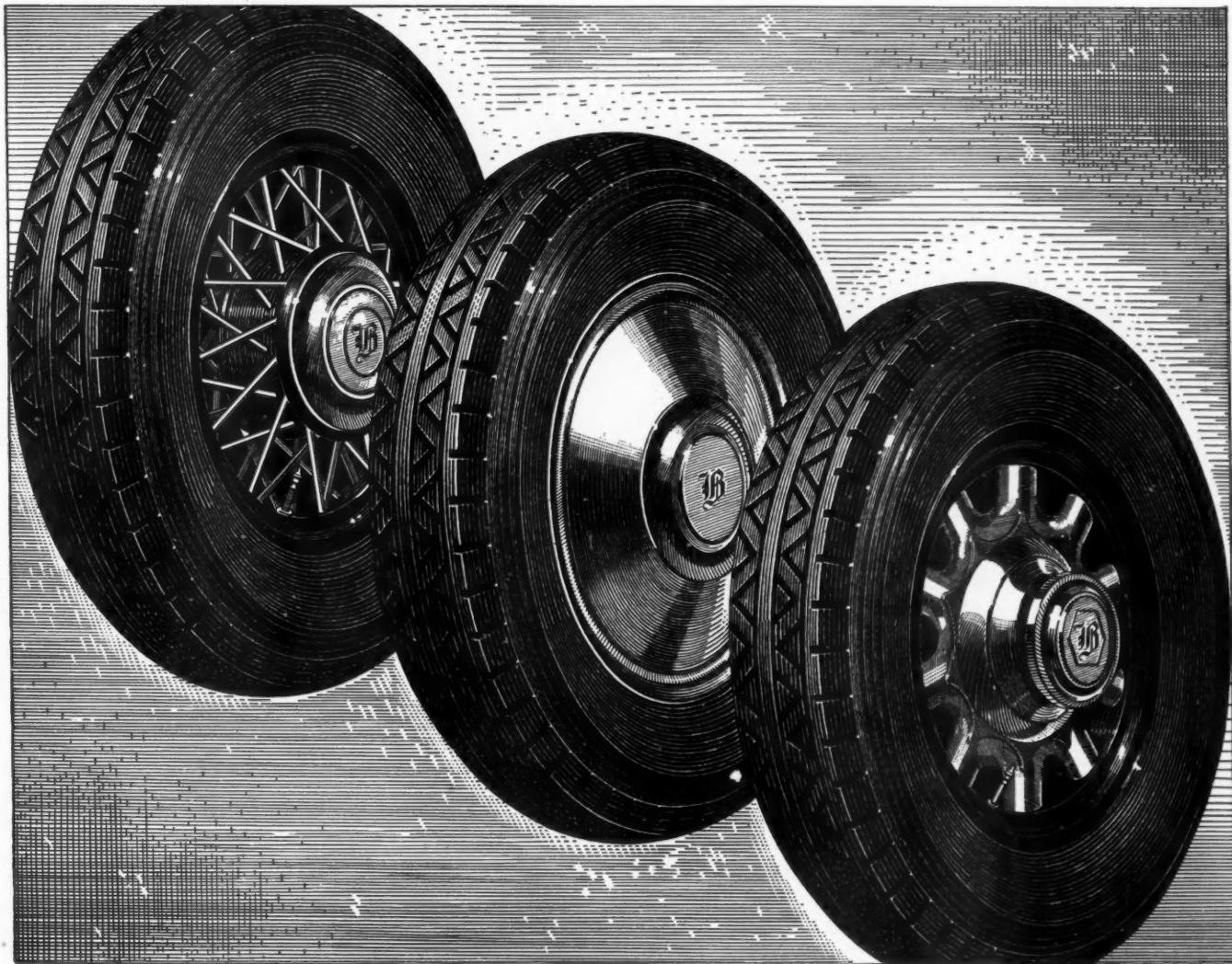
## NEW YORK SHOW WEEK EVENTS

|   |         |
|---|---------|
| Automobile Merchants Assoc., Dinner, Commodore, 6.30..      | Jan. 8  |
| International Registration, NACC offices, 10.30 a.m.....    | Jan. 9  |
| Packard Dealer Meeting, Roosevelt, 9.30 a.m. and 5 p.m..    | Jan. 9  |
| Packard Dealer Luncheon, Roosevelt, 12.30 noon.....         | Jan. 9  |
| Rubber Manufacturers Assoc. Meeting, Waldorf, 10.30 a.m.    |         |
| Jan. 11   |         |
| Stutz Dealer Meeting, 16 W. 61st, 10.30 a.m.....            | Jan. 10 |
| Reception of Overseas Guests, NACC offices, 11.30 a.m..     | Jan. 11 |
| Olds Motor Co., Dealer Meeting, Waldorf, 11.30 a.m.....     | Jan. 11 |
| International Luncheon, NACC offices, 12.30 noon.....       | Jan. 11 |
| Hudson Motor Car Co., Dealer Luncheon, Commodore, 12.30     |         |
| Jan. 11   |         |
| Hupp Motor Car Corp., Dealer Luncheon, Commodore, 1 p.m.    |         |
| Jan. 11   |         |
| International Trade Conference, NACC offices, 2.00 p.m....  | Jan. 11 |
| Metropolitan (SAE) Section Dinner, Commodore, 6.30 p.m.     |         |
| Jan. 11   |         |
| Stutz Dealer Meeting, Commodore, 9.30 a.m.....              | Jan. 11 |
| Oakland Dealer Luncheon, Waldorf-Astoria, 12.30 noon..      | Jan. 11 |
| Hudson Motor Car Co., Dealer Luncheon, Commodore, 12.30     |         |
| Jan. 12   |         |
| Auburn Automobile Co., Dealer Luncheon, Commodore, 12.30    |         |
| Jan. 12   |         |
| Olds Motor Co., Dealer Meeting, Waldorf .....               | Jan. 12 |
| Hupp Motor Co., Dealer Luncheon, Commodore, 1 p.m...Jan. 12 |         |

**Which shall it be?**

**WIRE . . . DISC . . . or ARTILLERY?**

**All three can now be had in STEEL!**



Some motorists prefer wire wheels. Some prefer the disc. Still others prefer the artillery type. That's a matter of personal taste. A matter of personal appeal.

But practically all motorists agree that their wheels should be *steel!* That's a matter of demand!

And now that Budd has developed the first successful artillery wheel in steel every *Automotive Industries*

motorist who favors the artillery type can have it in the material he wants—*all-steel*.

Why this great preference for steel?

Steel is strong. Steel is safe. Steel is modern. Steel is style.

**BUDD WHEEL COMPANY**

Detroit

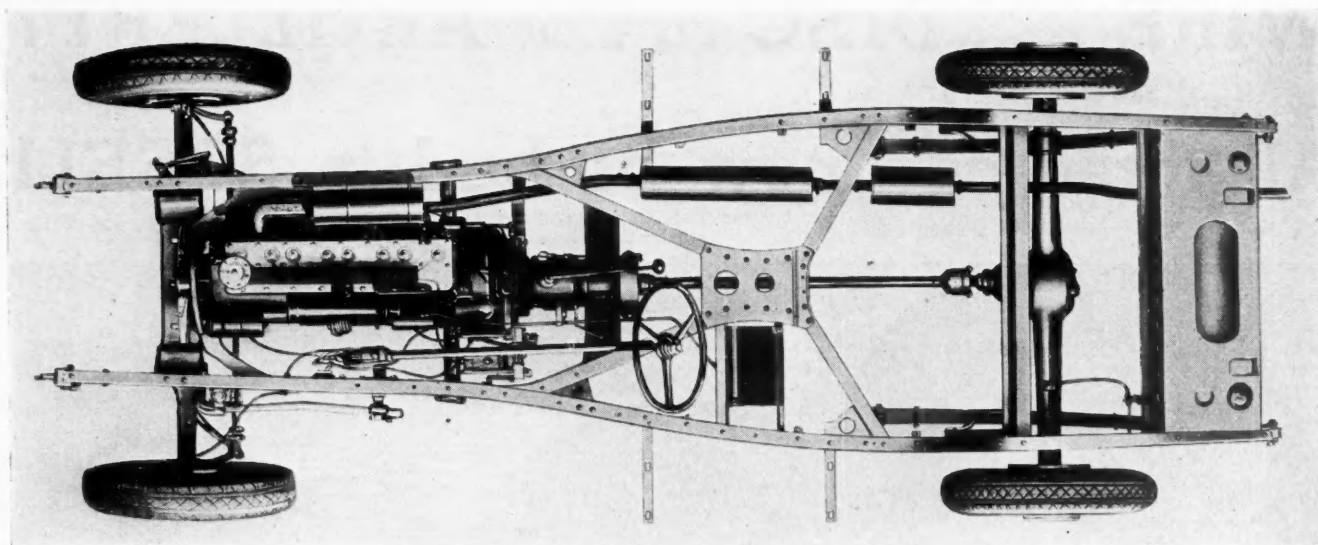
Philadelphia

**Makers of BUDD-MICHELIN WHEELS**

January 9, 1932

# Dodge Has Transmission Improvements

(Continued from page 61.)



Frames on the new Dodge models are of the X-member type, with longer front than rear legs. Note the transmission support cross-member, and the extension forward of the X-member front legs to form gusseting brackets for the front cross-member as well as to reinforce the side members at the front kick-up. Frame side rails follow body lines as formerly

## Specifications

Unless noted here specifications remain as formerly  
(n.c. also indicates no change).

|                              | Dodge Six      | Dodge Eight    |
|------------------------------|----------------|----------------|
| Wheelbase                    |                |                |
| Overall length               | 183 in.        | 19½ in.        |
| Tire size                    | 5.50/18        | 6.00/18        |
| wheel diameter               | 18 in.         | n.c.           |
| rim width                    | 3.25 in.       | n.c.           |
| Rear axle ratio:             |                |                |
| 5-pass. models               | n.c.           | 4.1 to one     |
| 2-4-pass. models             | n.c.           | 3.91 to one    |
| Max. bhp.                    | 76-3400        | 84-3400        |
| Bore                         | n.c.           | 3½ in.         |
| displacement                 | n.c.           | 282.1          |
| N A C C rating               | n.c.           | 33.60          |
| compress. ratio              | n.c.           | 5.2 to one     |
| engine mounting              | floating power | floating power |
| Carburetor model             | n.c.           | Strom. DXR-3   |
| nominal size                 | n.c.           | 1¾ in.         |
| Connect. rod:                |                |                |
| center to center             | n.c.           | 8 13/16 in.    |
| weight                       | n.c.           | 2 lbs.         |
| bearing diam. lower          | n.c.           | 2 3/16 in.     |
| length, lower                | n.c.           | 1 ½ in.        |
| Crankshaft weight            | n.c.           | 87½ lb.        |
| counterweights               | n.c.           | yes—8          |
| Pistons, length              | n.c.           | 3¾             |
| top to pin center            | n.c.           | 2 1/16 in.     |
| weight                       | n.c.           | 1.13 lb.       |
| fitting clearance            | n.c.           | .001-.0015 in. |
| Piston pin diameter          | n.c.           | 55/64 in.      |
| Valves, intake:              |                |                |
| head diameter                | n.c.           | 1 15/32        |
| port diameter                | n.c.           | 1 5/16 in.     |
| Distributor, No. of breakers | n.c.           |                |
| auto. spark adv.             | 14°-2550       |                |
| Battery capacity             | n.c.           | 117 amp. hrs.  |
| number of plates             | n.c.           | 17             |

|                             | Dodge Six    | Dodge Eight   |
|-----------------------------|--------------|---------------|
| Spark plugs                 | 14 mm.       | 14 mm.        |
| gap width                   | .020-.025    | .020-.025     |
| Starting ratio              | n.c.         | 21.66 to one  |
| Fan diameter                | 17 in.       | n.c.          |
| Radiator core depth         | 3¼ in.       | 3¾ in.        |
| Dash heat indicator         | yes          | n.c.          |
| Clutch control              | vacuum       | vacuum        |
| facings, inside diam.       | n.c.         | 6¾ in.        |
| Transmission counter-shaft: |              |               |
| bearing type                | roller       | roller        |
| Free wheeling type          | standard     | standard      |
| Axle shaft diam.:           |              |               |
| at bearing                  | n.c.         | 1 7/16 in.    |
| Brakes, drum diam.          | 12 in.       | 13 in.        |
| lining width                | 1¾ in.       | 2 in.         |
| length wheel                | 21 23/32     | 23 9/16 in.   |
| contact area                | 138 sq. in.  | 172.5 sq. in. |
| Brake drums                 | C.I.         | C.I.          |
| make                        | Motor Wheel  | Motor Wheel   |
| type                        | centrifuse   | centrifuse    |
| Tread, front                | n.c.         | 56¾ in.       |
| rear                        | n.c.         | 58 11/16 in.  |
| Steer. knuckle:             |              |               |
| bushing diam.               | n.c.         | 7/8 in.       |
| lower, length               | n.c.         | 1½ in.        |
| Steering gear ratio         | n.c.         | 17 to one     |
| Camber angle                | 1 deg.       | 1 deg.        |
| Castor angle                | 1¼ deg.      | 1¼ deg.       |
| Frame kick-up front         | 3¾ in.       | 4 21/32 in.   |
| frame type                  | X-member     | X-member      |
| Springs, front length       | sub-frame    | sub-frame     |
| rear length                 | 35 11/16     | 35 11/16 in.  |
| kick shackle                | 54¾          | 54¾ in.       |
| lubrication                 | yes          | n.c.          |
| Mufflers used               | oilite disks | oilite disks  |
| rear muffler diam.          | none         | 2-tandem      |
| rear muffler length         | none         | 6 in.         |
|                             |              | 12 in.        |

the two-passenger coupe have split seats, with only the driver's part adjustable. The five-passenger coupe has the driver's seat adjustable.

In the eight the power of the engine has been increased by enlarging the bore. For quietness an asymmetric type of fan has been adopted, with the blades set at 50 and 130 deg., and cooling has been increased in proportion to the higher power.

Brake drums are of the new "centrifuse" type manufactured by Motor Wheel Co., consisting of a cast-iron liner spun into a steel drum for increased resistance to wear without large increase in weight. Two exhaust mufflers are mounted in tandem.

Springs are carried in silent block bushings at all frame joints, with bronze bushings at the rear end of

(Turn to page 76, please)

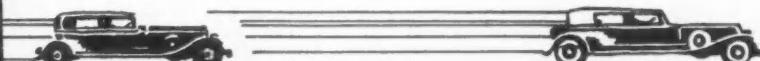
# STEEL CAP CONTROL MAINTAINS OIL CLEARANCES

Probably the most revolutionary development in connection with the Bohnalite Connecting Rod is the Steel Cap Control and its important functions.

This ingenious refinement is so designed that oil clearances are maintained constant at all temperatures. This is a great step forward.

Nor is this Bohnalite Connecting Rod in the experimental stage. It has been used in large motor car production for two years. And users are our most enthusiastic endorsers.

Bohnalite being 62% lighter, reciprocating parts can be materially lightened—one of the most important points in the development of improved performance.



With Bohnalite Rods an engine can be run faster, with the same bearing loads as develop in an engine with steel rods run at a much slower speed. And due to the great heat-dissipating qualities of Bohnalite, the engine bearings also run cooler.

In short, Bohnalite Connecting Rods with Nelson Bohnalite Pistons form the ideal combination for the modern high speed engine—particularly for multi-cylinder units.

These advanced light alloy rods come completely finished in balanced sets ready for installation.

BOHN ALUMINUM & BRASS CORP., DETROIT, MICH.  
New York      Chicago      Cleveland      Pittsburgh

NELSON  
**BOHNALITE**  
PISTONS

the springs, giving a shackle having a rubber upper and bronze lower bushing. On the eight the springs carry "Oilite" disks at the leaf ends, these disks being of a self-lubricating type of metal. The design is intended to reduce spring friction and render it more constant, irrespective of temperature conditions. Spring covers are standard equipment.

Most of the changes found in the eight are incorporated also in the Dodge six. These include the alterations in body lines, exterior and interior fittings. Of the mechanical innovations, floating power, automatic clutches, free wheeling, "silent gear selector" transmissions, the new brake drums and the new X-member frame are to be found on the six also.

The wheelbase of the six is now 114 in. Five wire or demountable wood wheels are available at the option of the purchaser. Thermostatic shutters on the eight are replaced by a shutter type grille on the six, circulation control being by thermostat.

Other changes on both lines of cars include: larger brakes, new spark timing, roller bearings for the transmission countershaft, and a new front axle-end design. Incidentally, treads on the new Dodge cars are slightly narrower than last year, although still exceeding "standard" size.

On the eight the steering gear ratio has been increased to 17 to one, and the starter ratio has been raised for easier starting. Kick shackles are now found at the front of the left front springs on both cars. Rear axle ratios have been dropped on the eight for a higher top speed with these cars.

There are four body styles on each chassis. Both lines carry a five-passenger sedan, two-passenger coupe with rumble seat, and a convertible coupe. On the Dodge eight there is also a five-passenger coupe, while there is a business coupe on the six.

## Hudson and Essex Add Power

(Continued from page 49)

ment lighter and more flexible springs have been adopted on both cars.

Body insulation against noises arising either from the chassis and engine or in the body itself has been rather carefully worked out. There is a pad resting across the top bows which effectively muffles this unit. A fibrous jute composition is cemented to the door panels to prevent drumming. "Pressure feet," or adjustable clips, press the jute pads against the panels to break up vibration waves. The rear body-panel is also lined with jute, as are all flat surfaces, including the rear seat-pan. Wood filler-pieces are placed inside the body pillars for silencing. Under the roof molding "dum-dum," a plastic compound, is used for silencing, with a fibre tacking-strip imbedded in the dum-dum all around the top. The roof molding is fastened to this strip.

A jute pad covers the inside face of the dash, and is extended back to the front seat, covered on the floor and toeboards by a sponge rubber mat impregnated with wool on top for better appearance, the wool being waterproofed. Behind the dash is 7/16 in. of composition insulating board. All pedal openings are sealed with grommets. Cotton felt rolls are squeezed between the inner and outer cowl panels to eliminate fumes from the engine compartment entering the body.

The instrument board, as will be noted from the accompanying illustration, is entirely new in conception. Only three actual instruments are retained, a large clock-face type speedometer under one glass and a combination fuel and oil level gage and engine heat indicator under another.

## New Auburns Have Selective Rear Axle Gear Ratio

(Continued from page 45)

changed correspondingly when the rear-axle gear is shifted. The conventional three-speed transmission with helical constant-mesh gears and synchromesh and free wheeling is retained.

Specifications of the new Auburn twelve-cylinder engine are given in an accompanying table. This engine is responsible for the increased wheelbase, all of the 6 in. of difference between the wheelbases of the twelve and the eight being ahead of the dash. Carburetors are single downdraft Strombergs.

As on the eight, there are three tire options on the twelve, the standard size on the standard line being 6.00-in. section, with 6.50 in. standard on the custom, and 12 and 7.00 in. available at extra cost, all on 17-in. wheels. The clutch used in the Auburn twelve is a two-plate Long, with spring-cushion center. Transmissions are similar to those on the eight except larger in dimensions. Universals are of Mechanics Machine Co. manufacture.

The new brakes, as has been mentioned, are hydraulically operated two-shoe Bendix, with 14-in. drums, 2 in. wide. The drums are of pressed steel, with cast iron spun in centrifugally, for longer life and decreased wear and scoring. The main change in the frame is an increase in stock thickness. Kick shackles are found on the twelves as well as on the eights. The coil springs for this shackle are lo-

cated in the left front spring horn.

Engine mounting is of the four-point type, solid at the front and rubber insulated at the rear. There is a two-breaker distributor, with two coils. Exhaust manifolds are finned for cooling and exhaust pipes are covered with insulating material to guard against vapor lock, etc.

Blocks and crankcase for the twelve-cylinder engine are in a single casting, with horizontal valves operated from a single camshaft. Crankshafts are counterweighted. The angle between the blocks is 45 deg., which gives a compact engine.

Ride regulators are available on the custom twelve only. Startix is standard equipment on all models, as is free wheeling. The dual-speed axles are found only on the custom lines.

As can readily be imagined, this new Auburn twelve, with its 160-hp. engine and relatively light weight for a car of its size, has rather outstanding performance characteristics. It is entirely possible to drive this car in high gear in the transmission under most conditions, except perhaps in starting up on a hill, using only the two-speed axle gear. However, that it is not the intention of the Auburn Automobile Co. that the car should be operated in this way is evidenced by the fact that the control lever has been placed on the dash.